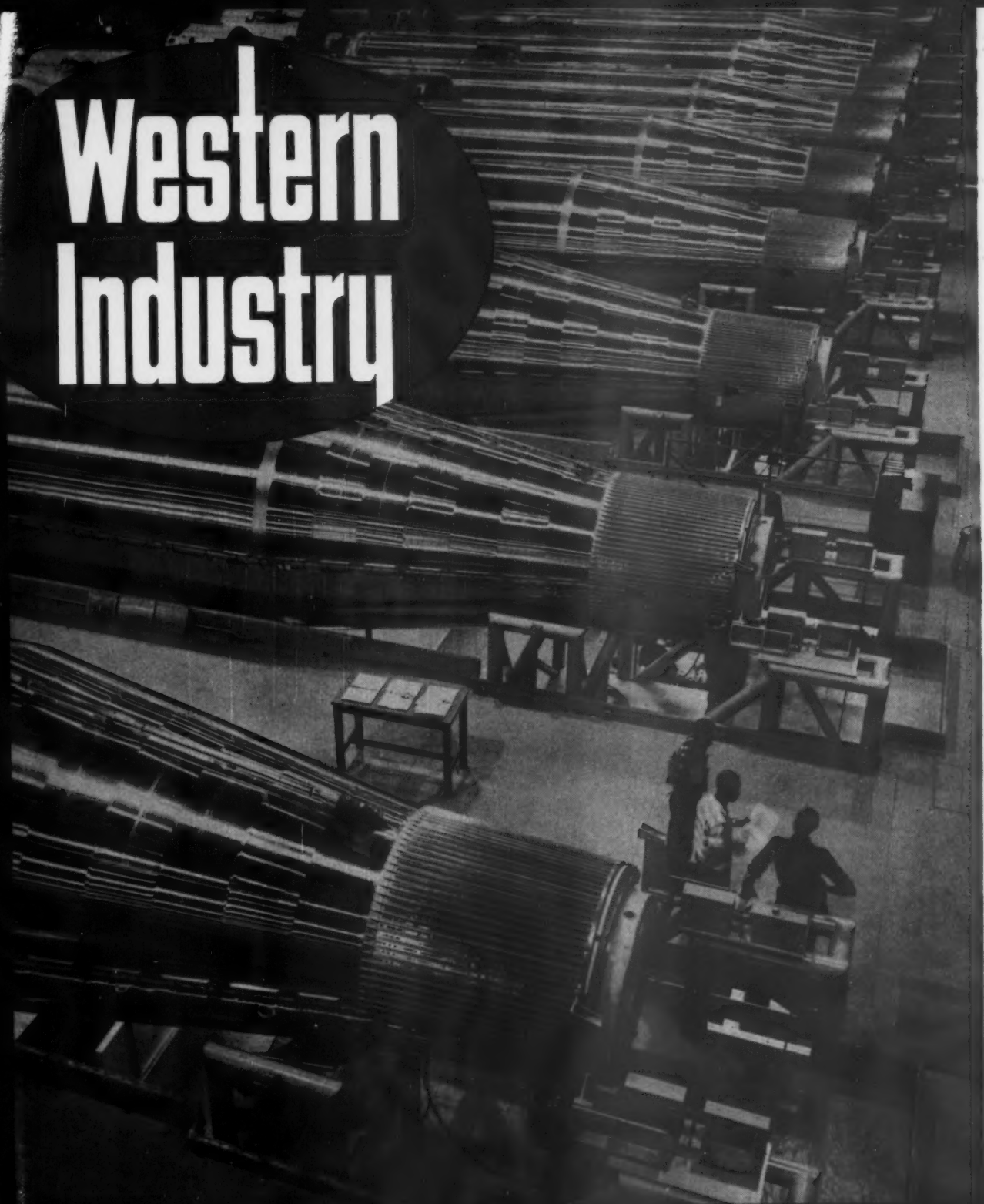
Western Industry



March 1959

Vol. XXIV No. 3

PENNZOIL'S HYDRAULIC FLUID

PROTECTS LIVES
AND EQUIPMENT AGAINST FIRE

- No adverse effect on seals or gaskets
- Specially prepared Water not necessary
- No swelling, softening or drying out of seals
- Holds wear to a minimum
- Non toxic
- Non foaming

Common tap water may be used as "make-up" if evaporation reduces viscosity.

The pictures at top left show the blast of flame created by "Currently accepted Fire Resistant Fluid" when injected into a furnace. A conventional electrically heated and thermostatically controlled laboratory furnace was brought to a temperature of from 1000°F. to 1100°F. It was permitted to remain on control temperature until constant. The furnace door was then opened and the jet of fluid injected. The pictures below left show the extinguishment of this flame by Pennzoil Hydraulic Fluid FR. There is no ignition of fluid, no liberation of corrosive, toxic, or otherwise injurious vapors.

This test was one of many which proved Pennzoil's Hydraulic Fluid FR to be the best answer to requests by Plant Managers and Safety Engineers for a true fire resistant fluid.

SEND FOR TECHNICAL BULLETIN FR

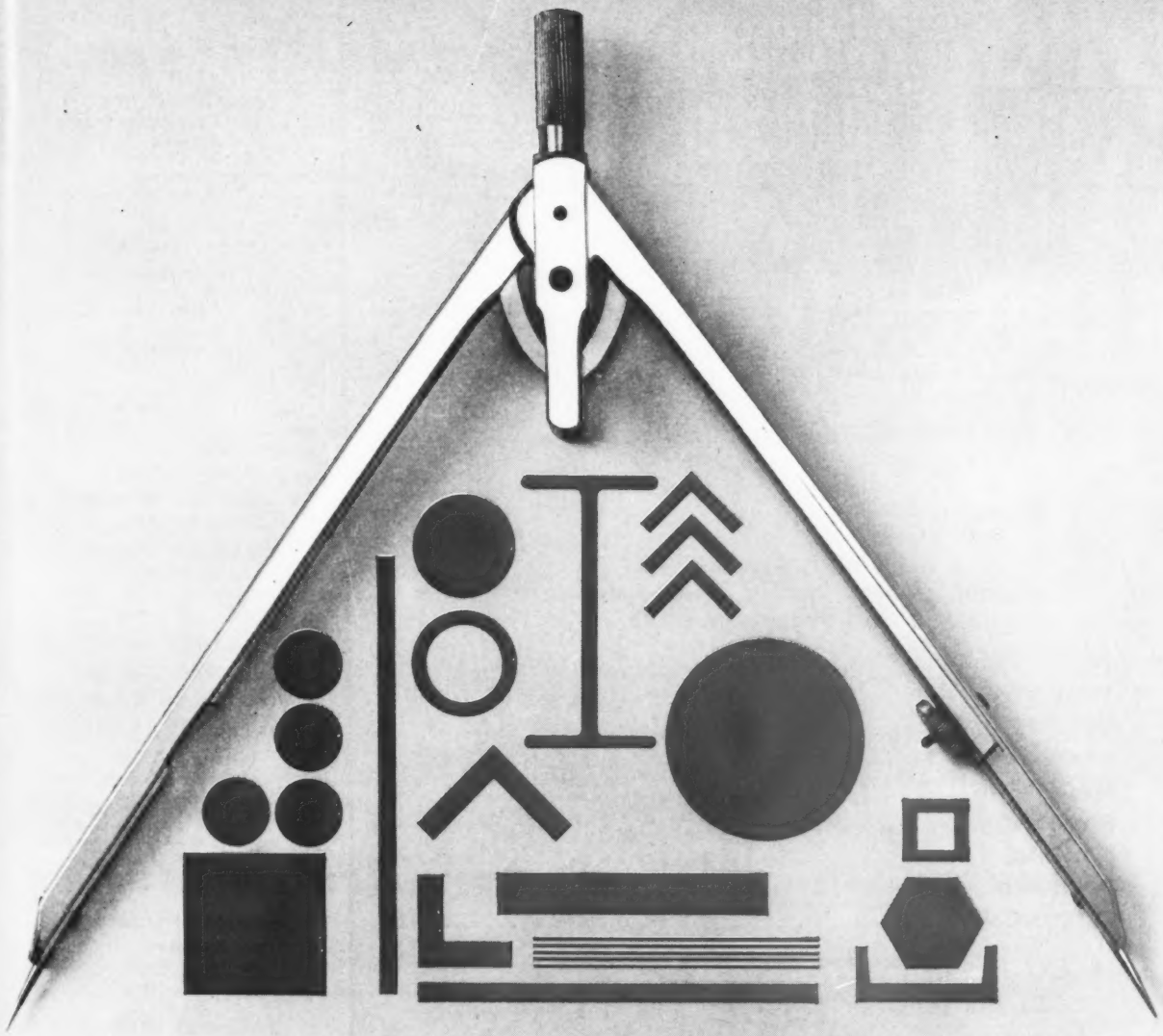
THE PENNZOIL COMPANY
1630 W. OLYMPIC BLVD.
LOS ANGELES 15, CALIF.

SUPREME QUALITY
PENNZOIL
LUBRICANTS

Branches and Distributors to serve you in principal western state cities

. . . for more details, circle No. 1 on Reader Service Postcard

. . . for more details, adv. opp. page, circle No. 2 on Reader Service Postcard →



HOW DO YOU MEASURE SERVICE?

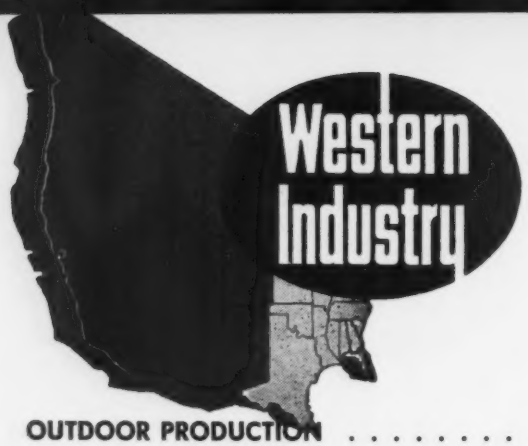
One of the best measures of service is *completeness of stocks*... stocks that are available quickly and in quantity.

Maintaining complete stocks of the steels *you* need—ready when you need them—is Jorgensen's business. Immediate delivery, by truck from Jorgensen's own fleet, is an added measure of service. And it doesn't stop there. Jorgensen service also includes modern handling and cutting facilities, as well as a staff of metallurgical engineers to help you solve your steel problems.

EARLE M. JORGENSEN CO.
STEEL

Next time...this time...whenever you need steel—call Jorgensen first!

LOS ANGELES	SAN DIEGO	OAKLAND	SAN FRANCISCO	HOUSTON	DALLAS	TULSA	DENVER
10650 S. Alameda St.	2668 Fifth Ave.	1657 W. Grand Ave.	700 Pennsylvania Ave.	5311 Clinton Dr.	2030 W. Commerce St.	7311 East Pine St.	635 - 18th Street
LO 7-1122 • NE 8-6171	BEImont 2-7473	HIgate 4-2030	Mission 7-7800	ORchard 2-1621	Riverside 1-1761	TEmple 5-1511	AMherst 6-3493



KING PUBLICATIONS

March, 1959
Vol. XXIV, No. 3

OUTDOOR PRODUCTION 27
By taking advantage of mild Western climate, and advanced engineering and maintenance techniques, this firm is building a highly efficient plant—that operates outdoors!

HOW YOU CAN USE PUMPS 30
Pumps can play important parts in your production picture . . . as at this plant which uses them throughout the operation to boost production.

METALS in the WEST
A roundup of best Western metalworking techniques in the Space Age. Section starts on p. 31.

METALLURGY 32
WELDING 34
BRAZING 37
CASTING 39
MACHINING 41
FINISHING 46
BONDING 48
FORGING 49
EXTRUSIONS 53

Selected maintenance and production techniques 55
Our Know-How Notebook #1 contains many practical tips for saving time and money under Western plant operating conditions.

BEST METALS MANUALS 61
Here's your roundup of the best metal and metalworking manuals available. They're departmentalized for easy selections. Yours free. Use postcard on p. 85.

11th WESTERN METAL CONGRESS-EXPOSITION
A show preview . . . giving you a complete agenda for each day of the Congress . . . and a booth-by-booth run down of who's exhibiting what at this important Los Angeles show. Section starts on p. 72

COVER PHOTO—*This is the Atlas production line at the San Diego plant of Convair (Astronautics) Division of General Dynamics Corp. The big stainless steel missiles—10 ft. in dia. and 75 ft. long—are nested in elevated docks. This photo proves that metals needed for missiles are being used and fabricated on an assembly line basis.*

DEPARTMENTS

Western Meeting Reports 10
Helpful Literature 98
New Equipment 104
Industrial West on its Way 107
Index to Advertisers 118

EDITOR
Peter A. Dickinson

NEWS EDITOR
M. C. Tracy

CONSULTING EDITORS
A. C. Prendergast
Market and Industrial Development
Roy C. Henning
Electricity and Electronics

609 Mission St.
San Francisco 5, Calif.

MANAGING EDITOR
John G. P. Sherlock
The Plan Room Building
1417 Georgia St.
Los Angeles 15, Calif.
Richmond 9-5540

•

PUBLISHER
Robert C. Johnson

PRODUCTION MANAGER
Shirley Hunt

CIRCULATION MANAGER
C. J. Prodinger

•

Published monthly by
KING PUBLICATIONS
609 Mission Street
San Francisco 5, Calif.
Phone YUkon 2-4343

James I. Ballard . . . . President
L. P. Vrettos . . . Vice President and General Manager
Robert C. Johnson . . Vice President

•

DIRECTOR OF RESEARCH
Lee Arbuthnot

•

ADVERTISING SALES

Bertrand J. Smith,
District Manager
609 Mission Street
San Francisco 5, Calif.
YUkon 2-4343

James J. Elliott,
District Manager
The Plan Room Building
1417 Georgia St.
Los Angeles 15, Calif.
Richmond 9-5540

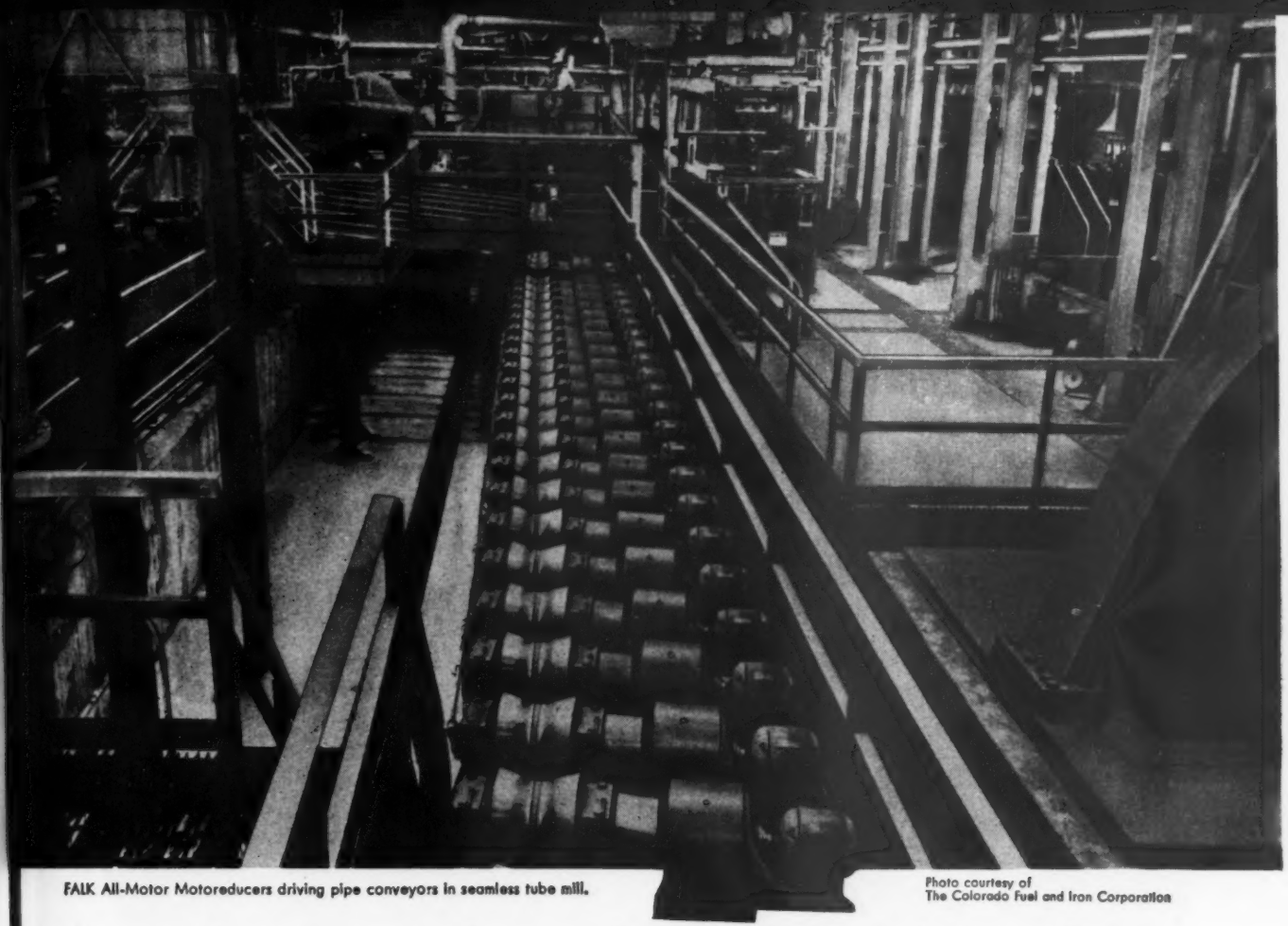
BPA

Subscription rate: $10.00 per year.
Cost per single copy: $1.00

Accepted as Controlled Circulation Publication at Portland, Oregon. Postmaster: Please send Notice 3579 to Western Industry, 609 Mission Street, San Francisco 5, California.
For Change of address, write Circulation Dept., 609 Mission St., San Francisco 5, Calif.

Copyright 1959, King Publications

The Essential Publication for Manufacturing Management in the New Industrial West



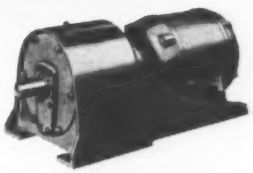
FALK All-Motor Motoreducers driving pipe conveyors in seamless tube mill.

Photo courtesy of
The Colorado Fuel and Iron Corporation

You get these "extras" when you buy FALK *all-steel* Motoreducers

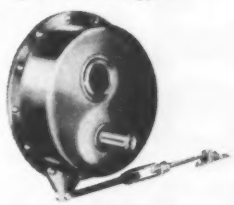
1. **Freedom from damaged housings.** The exclusive FALK *all-steel* construction gives full protection from cracked housings or torn-off feet...plus twice the ability of cast iron to maintain vital alignment.
2. **12-15% reserve load-carrying capacity** in the gears, by AGMA standards. The extra-depth, high pressure angle helical gears are another FALK exclusive ...they assure better operation and longer gear life.
3. **Highest known gear efficiency**—98½% per gear train under full load! This means maximum productive work for your power dollar.
4. **Longer service life**...advanced FALK design makes it possible to machine both bores for each shaft assembly at one time, thus eliminating possible accumulation of tolerances that occurs when individually machined parts are assembled. The result—better alignment of revolving elements that permits units to transmit rated capacity longer.
5. **Standard units to fit your needs.** Integral and All-Motor® Motoreducers are available in horizontal, vertical and right angle types...a type for every use.

Units are available up to 75 hp; output speeds from 780 rpm down to 1.2 rpm. Prompt delivery from factory, warehouse or distributor stocks. Ask your FALK Representative or Authorized FALK Distributor for *Bulletin 3100.*



THE FALK ALL-MOTOR® MOTOREDUCER
the original All-Motor unit

(Shown) Horizontal concentric model. Also available in right angle and vertical types.



THE ALL-STEEL FALK® SHAFT MOUNTED DRIVE

Proved best for the countless industrial applications where a reducing unit mounting directly on shaft of the driven machine is indicated.

Units from 1/2 to 50 hp. Ratios —4:1, 14:1 or 24:1. Torque capacity up to 41,000 lb-in (in standard units). Prompt shipment from stock. For details, ask for *Bulletin 7100.*

THE FALK CORPORATION, MILWAUKEE 1, WIS.

MANUFACTURERS OF QUALITY GEAR DRIVES AND FLEXIBLE SHAFT COUPLINGS

Representatives and Distributors in most principal cities

. . . for more details, circle No. 3 on Reader Service Postcard

FALK

. . . a good name in industry

COLT
natural ventilation

45,000-plus installations across the world prove COLT economy and dependability! Boost employee morale and production with positive ventilation in any weather . . . and with no operating costs!

ADJUSTABLE

WEATHERPROOF

Wide range of ventilators to suit every need—in stock now. Send coupon for descriptive literature.

LIGHTWEIGHT

Constructed from anti-corrosive hardened aluminum.

FITS ANY ROOF

NEW COLT "O/SR"
RESERVE-CAPACITY VENTILATOR

This new, extra high performance ventilator was developed by COLT to meet the problem of venting occasionally excessive heat and fumes. The airfoil adjustable center provides a large clear opening which creates lift to increase extraction velocity. Rainproof flaps may be set for normal conditions, opened wide to exhaust extreme heat, or closed to retain heat on cold days.

AIRFOIL DESIGN

CUT OUT COUPON AND MAIL TODAY

FREE LITERATURE. Please send items checked, without obligation.

☐ New, revised TECHNICAL MANUAL describing the COLT System.

☐ "Some Aspects of Fire Prevention in Industrial Buildings", by M. J. Reaney.

NAME_____

TITLE_____ PHONE_____

COMPANY_____

ADDRESS_____

CITY_____ ZONE____ STATE_____ WI

COLT VENTILATION OF AMERICA, INC.

4652 Hollywood Blvd., Los Angeles 27, California • NOrmandy 2-1181

Southern California Distributor • RELIABLE STEEL SUPPLY CO., *740 East 111th Place, Los Angeles 59, California • PLymouth 6-8111*

. . . for more details, circle No. 4 on Reader Service Postcard

Three Rust-Oleum DIFFERENCES that save you time, money and metal!

GOES ON FASTER

No tedious surface preparations usually required — just scrape and wirebrush to remove rust scale and loose rust — then brush Rust-Oleum 769 Damp-Proof Red Primer right over the remaining rust.

STOPS RUST

Rust-Oleum's *specially-processed* fish oil vehicle works down through the rust into the tiny, microscopic pits in the bare metal where it drives out air and moisture to *stop rust.*

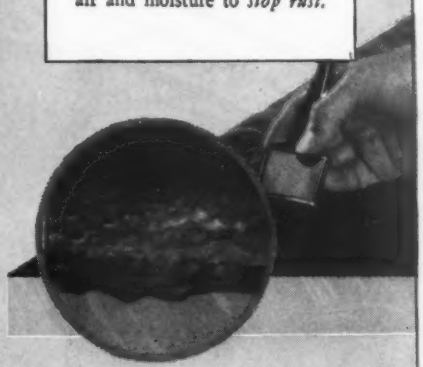
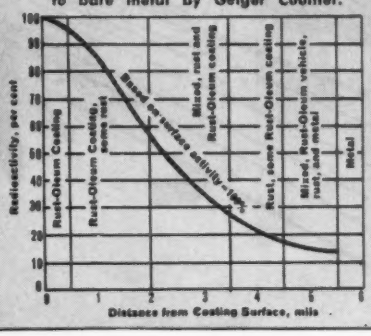


Chart shows results of tracing radio-activated Rust-Oleum through rust to bare metal by Geiger Counter.


Radioactivity, per cent
Rust-Oleum Coating
Rust-Oleum Coating, some rust
Based on surface activity = 100%
Mixed, rust and Rust-Oleum coating
Rust, some Rust-Oleum coating
Mixed, Rust-Oleum vehicle, rust, and metal
Metal
Distance from Coating Surface, mils

LASTS LONGER

Applied over rust, Rust-Oleum lasts longer for the *over-the-years protection* you need. It resists sun, salt water, salt air, fumes, heat, humidity, moisture, weathering.

These are just a few of many important *differences* that separate Rust-Oleum from ordinary coatings. When you consider that Rust-Oleum covers approximately *30% more area,* depending upon surface condition and porosity . . . and the fact that Rust-Oleum finish coatings are available in nearly every color for the beauty you want plus *double protection* . . . it's just good, common sense to use Rust-Oleum. Prompt delivery from Industrial Distributor stocks. Write for illustrated literature with color charts, and for the complete 30-page report on Rust-Oleum penetration.

RUST-OLEUM®

STOPS RUST!®

See complete catalog in Sweets

Rust-Oleum is distinctive as your own fingerprint. Accept no substitute.

ATTACH TO YOUR LETTERHEAD — MAIL TODAY

Rust-Oleum Corporation
2442 Oakton Street • Evanston, Illinois

- ☐ Complete literature with color charts.
- ☐ 30-page report on Rust-Oleum penetration.
- ☐ Nearest source of supply.

Rust-Oleum and Stops Rust are brand names and registered trademarks of the Rust-Oleum Corporation.

. . . for more details, circle No. 5 on Reader Service Postcard

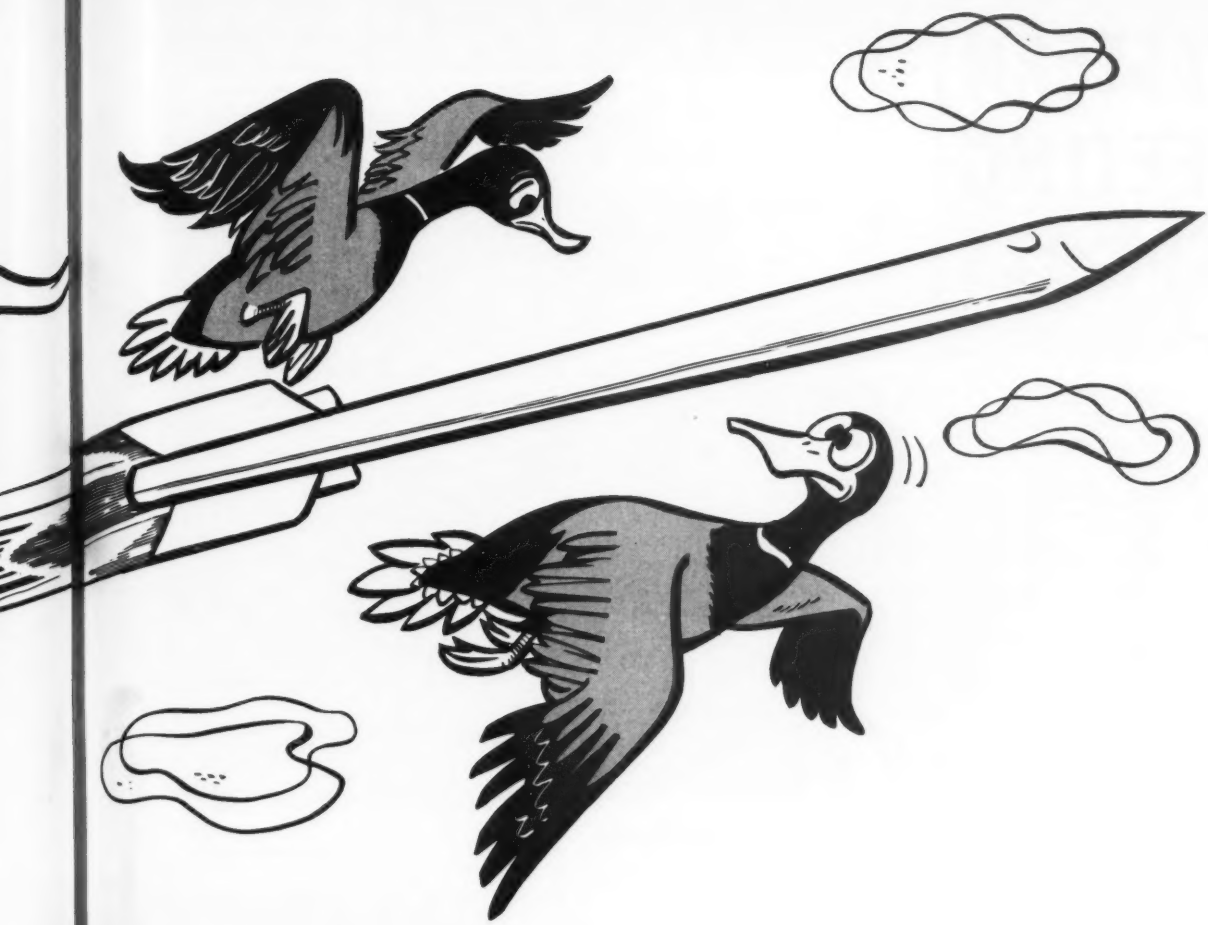
birds of a feather?

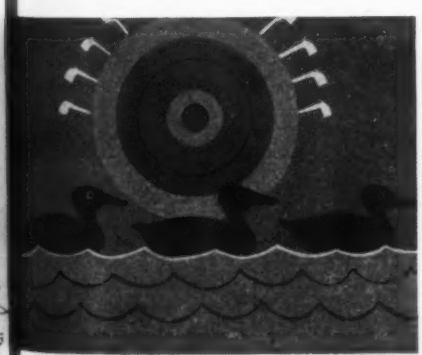
SPACE "BIRDS" AND TARGET DUCKS...

... are not exactly birds of a feather ... but they do have something in common: parts made by General Metals Corporation.

Providing alloy steel castings and precision forgings for missiles, and simple malleable castings for shooting gallery ducks, illustrates the wide range of castings and forgings available from our diversified facilities.

No matter what your "feather," we offer you the same assurance of dependable quality.





Drop in at our Booth No. 221 at the WESTERN METAL SHOW

Pan-Pacific Auditorium Los Angeles—March 16-20

GENERAL METALS CORPORATION

The most complete Foundry and Forge services in the West

Iron & Steel Foundry
550 - 85th Avenue
Phone: SWeetwood 8-0130
Oakland 21, California

Forge Plant — Malleable Foundry
5701 So. Boyle Avenue
Phone: LUdlow 8-9163
Los Angeles 54, California

Forge Plant
Liberty & Homestead Rds.
Phone: ORchard 2-1775
Houston 1, Texas

. . . for more details, circle No. 6 on Reader Service Postcard

A THREE-DAY ELECTRICAL MAINTENANCE CONFERENCE will be held on March 24, 25 and 26 at the Los Angeles Furniture Mart Building in Los Angeles.

William E. Cline, General Electric Co., is chairman of the event. Program committee consists of **Urban Beh,** consulting engineer; **Charles H. Hays,** The Electrical Estimators, Inc.; **Emerson S. Reichard,** electrical engineer; and **Lou Pascoe,** General Electric Co.

Topics will include: "Keeping Up To Date on the Code" . . . "Lighting" . . . "Industrial Power Systems" . . . "Maintenance of Electrical Equipment" . . . "Estimating Additions and Expansions" . . . "Control and Automation."

Conference sessions will be conducted daily from 8:30 a.m.-11:45 a.m. and 1:15 p.m.-4:45 p.m. If enough register for evening sessions, sessions will be scheduled on the evenings of March 24 and March 26. The four most requested sessions will be repeated in the evening sessions.

An all E.M.E.A. member and Conference banquet is scheduled for the evening of March 25 at Rodger Young Auditorium where there will be an outstanding speaker presentation and a display of electrical exhibits by sponsoring firms.

•

THE CALIFORNIA REGIONAL FOUNDRY CONFERENCE will be held Friday and Saturday, March 13-14 at the Huntington-Sheraton Hotel, in Pasadena, Calif.

Sessions will include those on Steel, Iron, Non-Ferrous, Magnesium and Aluminum, as well as Pattern Making, Cleaning Room and general topics.

Special events will include luncheons on Friday and Saturday; dinner on Friday evening; and fellowship hours on Friday and Saturday nights. Further information may be obtained from **Earl Appleman,** Calmo Engineering Co., 1500 Esperanza St., Los Angeles 23, Calif.

PROGRAM

1959 Industrial Materials Handling & Packaging Conference

March 26, 1959, Stanford University

8:15 Registration at Memorial Auditorium (directly across from Hoover Tower)

8:40 Opening Remarks by **Robert Stevens,** Conference Steering Committee Chairman

9:00 Panel Discussion, "The Development and Use of Efficient Unit Loads"
Panel Members: **William Sardo,** Exec. V. Pres., National Wooden Pallet Manufacturers' Association, Wash., D. C. **Larry Haupt,** Plant Manager, Proctor & Gamble; **Emil Real,** Methods Engineer, Continental Can Co.

10:15 Break

10:30 Technical Discussion of "Containerization" by **Robert Curley,** Director of Planning & Research for Consolidated Freightways, Inc.

11:10 A discussion of the problems found in "Labor's Approach to Mechanization" by **Dr. Lincoln Fairley,** Research Director, International Longshoremen & Warehousemen's Union.

12:00 Luncheon. Keynote address by **Charles P. Howard,** President, Howard Terminal, Oakland, Calif. "How Management Evaluates Materials Handling and Packaging Personnel and Their Efforts"
Presentation of scholarship award

1:40 "Future Trends in Military Packaging and Materials Handling" by **Clark Henderson** of Stanford Research Institute.

2:10 Separate and concurrent sessions begin:
(a) Packaging: "Determining the Effectiveness of Your Package" by **William Melziener,** President, Impactograph Corp.
(b) Materials Handling: Panel on "The Important Considerations for Warehouse Layout"
Panel Members: **Ed Beuter,** Operations Mgr., Zellerbach Paper Co.
Bob Thomas, V. Pres.-Oprs. & Whsg., Certified Grocers, Ltd.
F. B. Stewart, Dist. Mgr., U. S. Steel Supply Div., U. S. Steel Co.

3:10 Break

3:25 (a) Packaging: "Dynamic Testing of Packages" by **Paul Larmour** and **Max Hill** of Lockheed Aircraft Corp.
(b) Materials Handling: "In-Plant Materials Handling" by **L. Dellwig,** V. Pres.-Operations, Blake, Moffitt & Towne.

M-H, Packaging Program Readied

KEYNOTE SPEAKER at the Fourth Annual Materials Handling and Packaging Conference will be **Charles P. Howard,** president of Howard Terminal, Oakland.

Mr. Howard will speak at luncheon at the conference which will be held March 26 at Stanford University. The keynote speaker's talk will be entitled: "How Management Evaluates Materials Handling and Packaging Personnel and Their Efforts."

The steering committee for the conference announced that a $400 scholarship will be presented to a Stanford graduate or undergraduate industrial engineering student.

Robert Stevens, chairman of the committee, stated that the scholarships will be awarded to "encourage industrial engineering advancements in the fields of materials handling and packaging". The recipient of the scholarship award will be selected by a Conference Scholarship Committee.

Funds for the $400 award have been donated by the three organizations which sponsor the Annual Industrial Materials Handling and Packaging Conference: The

. . . continued on p. 14

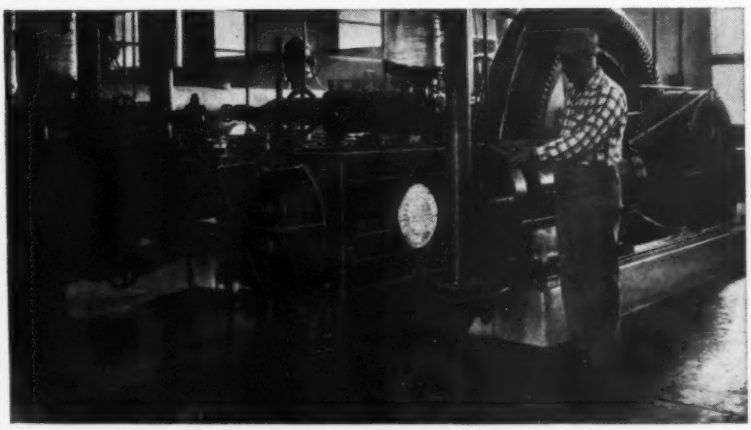
STANDARD ENGINEER'S FIELD REPORT

PRODUCT CHEVRON MULTI-MACHINE OIL ICH

FIRM VALLEY ICE COMPANY Stockton, California

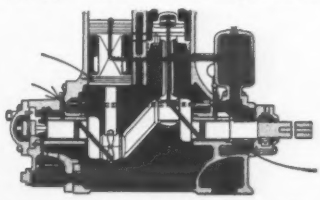
Compressor works 17 years without reboring

Only wiper and seal rings on this giant ammonia compressor were replaced by Valley Ice Company, Stockton, Calif., in 35 years service using Chevron Multi-Machine Oil ICH (formerly Calol). Machine was rebored in 1941. At recent routine inspection, chief engineer T. G. Griffith (above) reports no pitting or corrosion of interior parts. Machine was returned to service without repairs or new parts. This ball compressor, with 17" bore and 36" stroke is powered by 625 H.P. synchronous motor.



Chevron Multi-Machine Oil ICH is also used in second large horizontal compressor (above) and three smaller verticle compressors. Reports plant manager H. W. Hedburg: "Normal service life for these compressors is five to seven years before they need new pistons and rings. But one compressor, after 11 years on same pistons and rings, is still in top condition." Plant has capacity of icing 350 Western Pacific freight cars per day, or 525 tons of ice.

Why Chevron Multi-Machine Oil ICH reduces maintenance on bearings, pumps and compressors



- Resists formation of deposits; has extremely low pour point.
- Metal-wetting ability keeps oil on bearing under heaviest loads.
- Separates rapidly from water and contaminants.

For More Information on this product or a copy of the new free catalog: "A Lubricant Reference Guide to Economical Equipment Operation," call your Standard Engineer or Representative, or write 225 Bush St., San Francisco 20, California.

CHEVRON Industrial Lubricants

TRADEMARK "CHEVRON" AND CHEVRON DESIGN REG. U.S. PAT. OFF.

STANDARD OIL COMPANY OF CALIFORNIA

. . . for more details, circle No. 7 on Reader Service Postcard

It's 3M MAGIC!

SCOTCH BRAND
SCOTCH BRAND
SCOTCH BRAND
SCOTCH BRAND
SCOTCH BRAND
SCOTCH BRAND
SCOTCH BRAND
SCOTCH BRAND
SCOTCH BRAND
SCOTCH BRAND
SCOTCH® BRAND
SCOTCH BRAND

TAPEnology saves "face"...
polished metal stays blemish free!

Forming and handling polished metal sheet can be speeded . . . rejects almost eliminated . . . by using "SCOTCH" BRAND Masking Paper and tight-holding "SCOTCH" BRAND Masking Tape. Applied prior to forming operations, protective mask guards polished surfaces against scratches, die marks, staining; removes easily and cleanly. Production line speed can be maintained by using "SCOTCH" BRAND Apron Tapers to apply the tape to one or both edges of the paper as it is pulled from the roll. Fast, easy, economical . . . the cost-saving way to increase handling speeds!

Looking for cost-saving short cuts? No matter what your metal-working operations include, chances are there's a "SCOTCH" BRAND Tape distributor nearby who can show you how "TAPEnology" can help you turn out better work . . . faster . . . at less cost. Call him today for further information, or call your nearest 3M Company office. Western offices are located at:

LOS ANGELES 22, CAL.
6023 South Garfield Ave.
RAymond 3-6641

SOUTH SAN FRANCISCO, CAL.
320 Shaw Road
PLaza 6-0800

SEATTLE 4, WASH.
3663 First Ave. South
MUtual 2-5550

When tape costs so little, why take less than "SCOTCH" Brand?

"SCOTCH" BRAND TAPES
TAPE-O-RAMA Contest
135 prizes . . . write for details
FEBRUARY 1—JUNE 30, 1959

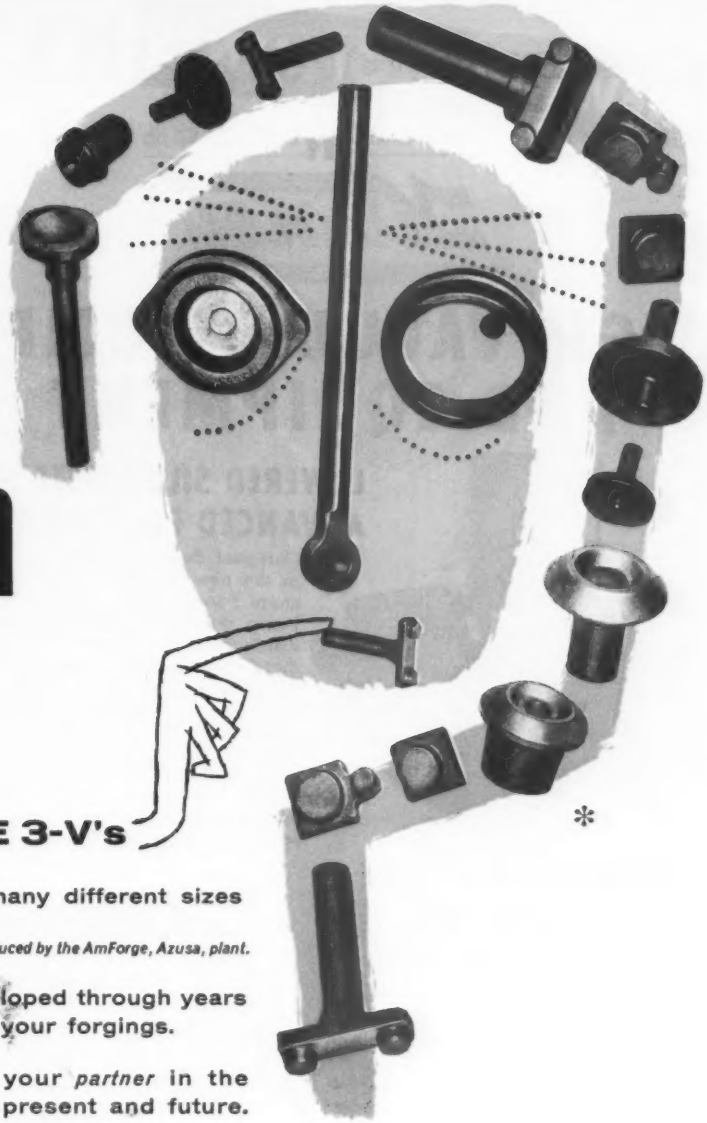
"SCOTCH" is a registered trademark for the pressure-sensitive adhesive tapes of 3M Co., St. Paul 6, Minn. Export: 99 Park Ave., New York 16. Canada: London, Ontario.

MINNESOTA MINING AND MANUFACTURING COMPANY
. . . WHERE RESEARCH IS THE KEY TO TOMORROW

3M COMPANY

. . . for more details, circle No. 8 on Reader Service Postcard

forging problem



Solve it with AMFORGE 3-V's

Variety: The equipment to forge many different sizes and shapes.

*Actual photographic reproductions of forged parts recently produced by the AmForge, Azusa, plant.

Versatility: The ability and skill developed through years of experience to help you engineer your forgings.

Vision: A willingness to become your *partner* in the solution of your forging problems, present and future.

Serving the Western states with forged parts is our business. Your cost, weight, stress and machining problems are our first concern. Our plant in Azusa, California, is equipped to follow through on the most complicated orders—either *Press* or *Upset* Forgings. Our engineers are prepared to work with you. Please phone us collect when you have a "forging" problem.

Phone—Azusa, EDgewood 4-4931.

AMERICAN Brake Shoe COMPANY

AmForge Division

155 N. WACKER DRIVE, CHICAGO 6, ILLINOIS

PLANTS: AZUSA, CALIFORNIA • CHICAGO, ILLINOIS

. . . for more details, circle No. 9 on Reader Service Postcard

NEW DEVELOPMENTS in Kinney®

HIGH VACUUM PUMPS AND EQUIPMENT

LOWERED SILHOUETTE AND ADVANCED PERFORMANCE

Compact design is well illustrated in the new KINNEY KDH-65 single stage Pump shown at the left. This Pump, with 3 hp motor and free air displacement of 65 cfm attains ultimate pressures to 10 microns. This same Pump, with 5 hp motor, provides free air displacement of 80 cfm and attains the same ultimate pressure as the KDH-65. Product development of this sort marks the entire KINNEY Pump line, assuring for you ever higher standards of pumping economy and smooth performance.

THERMOCOUPLE GAGE FEATURES NEW COMPENSATED TUBE

This new gage spans the range from 3000 microns to 1 micron with accuracy of ± 10% at mid-scale. It is available in 3 models covering 1 to 6 stations. No need for "matching" tubes . . . you can change a tube among a number of tubes in one circuit, as well as from circuit to circuit. Descriptive bulletin on request.

Complete your file of latest information on advanced KINNEY High Vacuum Equipment . . . Single Stage, Two Stage and Mechanical Booster Pumps—Oil Diffusion Pumps—Cold Traps—Vacuum Valves—Valves and Baffles — Packaged Pumping Systems — Power Units — Evaporators — Furnaces — Ovens — Crystal Growing and Purifying Units — Hermetic Sealers — Vacuum Accessories.

CALL WRITE OR WIRE THE KINNEY OFFICE NEAREST YOU

King-Knight Company
360 Jefferson Street
San Francisco 11, California

R. L. Dyer
903 Northern Life Boulevard
Seattle 1, Washington

KINNEY MFG. DIVISION
THE NEW YORK AIR BRAKE COMPANY
5058 VENICE BOULEVARD • LOS ANGELES • CALIFORNIA

. . . for more details, circle No. 10 on Reader Service Postcard

WESTERN MEETINGS

continued from p. 10 . . .

Charles P. Howard

Northern California Chapter of the American Material Handling Society; The Golden Gate Chapter of the Society of Packaging and Handling Engineers; and The Central California Chapter of the Society of Packaging and Handling Engineers.

Attendance at the conference is expected to be well over the 200 attendance experienced at the 1958 conference, which was held at the University of California in Berkeley. Joint sessions covering the broader aspects of advanced materials handling and packaging methods and equipment will be held in the morning of the one-day affair. After luncheon and presentation of the scholarship award, registrants at the conference will be able to attend special panel discussions on either materials handling or packaging. Two concurrent sessions on each subject are scheduled for the afternoon.

All of the technical sessions scheduled for the conference will be held in the Stanford Memorial Auditorium directly across the street from the Hoover Tower. Registration for the conference can be secured by contacting **Robert C. Morris,** Conference Committee Treasurer, 526 Mission Street, San Francisco 5, California. The fee for the 1959 Conference including luncheon has been set at $12.50.

Members of the steering committee for the 1959 Industrial Materials Handling and Packaging Conference include Chairman **Robert Stevens,** Fibreboard Paper Products Corp. and representative from the Golden Gate Chapter of

. . . continued on p. 18

EATON-RELIANCE cost-reducing

fasteners do the job easier, faster, surer

When you choose industrial fasteners for any type job, you look first for two things—QUALITY and PRICE. Eaton fasteners give you both. Eaton quality is the result of many years' experience, high engineering standards and an efficient quality control system. Eaton also gives you production and service geared to your schedules. The Eaton price is low--consistent with high quality—because machinery is modern, employees are skilled, and the raw steel is cold drawn, cold rolled and heat treated to rigid specifications.

Eaton-Reliance Industrial Fasteners are truly fasteners to be relied on. Design and industrial engineers in major fast-moving industries such as automotive, farm implement, construction machinery, appliance —to mention a few—call for Eaton quality fasteners on many varied types of assemblies.

An examination of our complete line, described in Engineering Bulletin 4K/3, will show you the wide range of types available and give you fresh ideas on cutting your fastener costs; send for a copy today, or request one of our industrial fastener engineers to call. There is no obligation.

EATON

RELIANCE DIVISION

MANUFACTURING COMPANY

516 CHARLES AVENUE • MASSILLON, OHIO

SALES OFFICES: New York • Cleveland • Detroit • Chicago • St. Louis • San Francisco • Los Angeles

PRODUCTS: Engine Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Hydraulic Pumps Motor Truck Axles • Permanent Mold Gray Iron Castings • Forgings • Heater-Defroster Units • Automotive Air Conditioners Fastening Devices • Cold Drawn Steel • Stampings • Gears • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers

. . . for more details, circle No. 11 on Reader Service Postcard

ROUTE TO:

- ☐ ENGINEERING
- ☐ PRODUCTION
- ☐ SALES
- ☐ PURCHASING
- ☐ MAINTENANCE
- ☐ CONSTRUCTION
- ☐ _____

A REPORT TO MANAGEMENT ON HOW

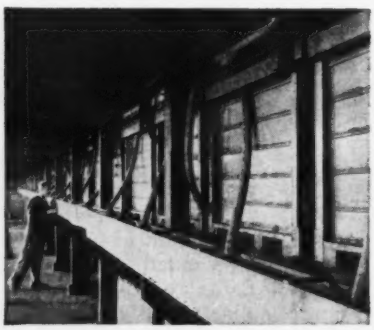
Industry cuts costs with FIR PLYWOOD

Fir plywood roof decking saved $3,000 on this 25,000 square foot elementary school in Tacoma, Washington, and helped bring the job in well under the original bid. With the architects' approval, the contractor switched from two-inch T&G lumber after cost studies showed that substantial savings could be made by using ¾-inch fir plywood.

While most of the savings came in labor and material, some ten to fifteen per cent came in the use of metal "H" clips which replaced lumber blocking in supporting panel edges. The clip idea points to new opportunities in reducing costs on commercial and industrial buildings as well as schools. Clips are available nationally; write for details.

Fir plywood pallets give extra capacity, last longer and save 9 lbs. per unit at Heidelberg Brewing Co. The firm has used over 5,200 since 1952; it reports plywood has eliminated pallet failure. Repair costs are negligible. Write for DFPA report on design and use of plywood in pallet construction.

Switch from aluminum to fir plywood for these "bottomless boxes" saves $5,000 per year in maintenance and replacement costs for Keeney Truck Lines, Los Angeles. Collapsible boxes have sides, no bottom. They slip over palletized bricks to hold them securely in position during handling, shipping.



Over $30,000 savings in four years was made by switching to overlaid fir plywood for these electro-plating cells. The plywood acid tanks cost only $140 each—$400 to $600 less than rubber-lined steel tanks. Plywood also solved leakage problem which has been encountered with the lumber tanks.

FOR MORE INFORMATION about fir plywood—its uses, properties and advantages—write

DOUGLAS FIR PLYWOOD ASSOCIATION

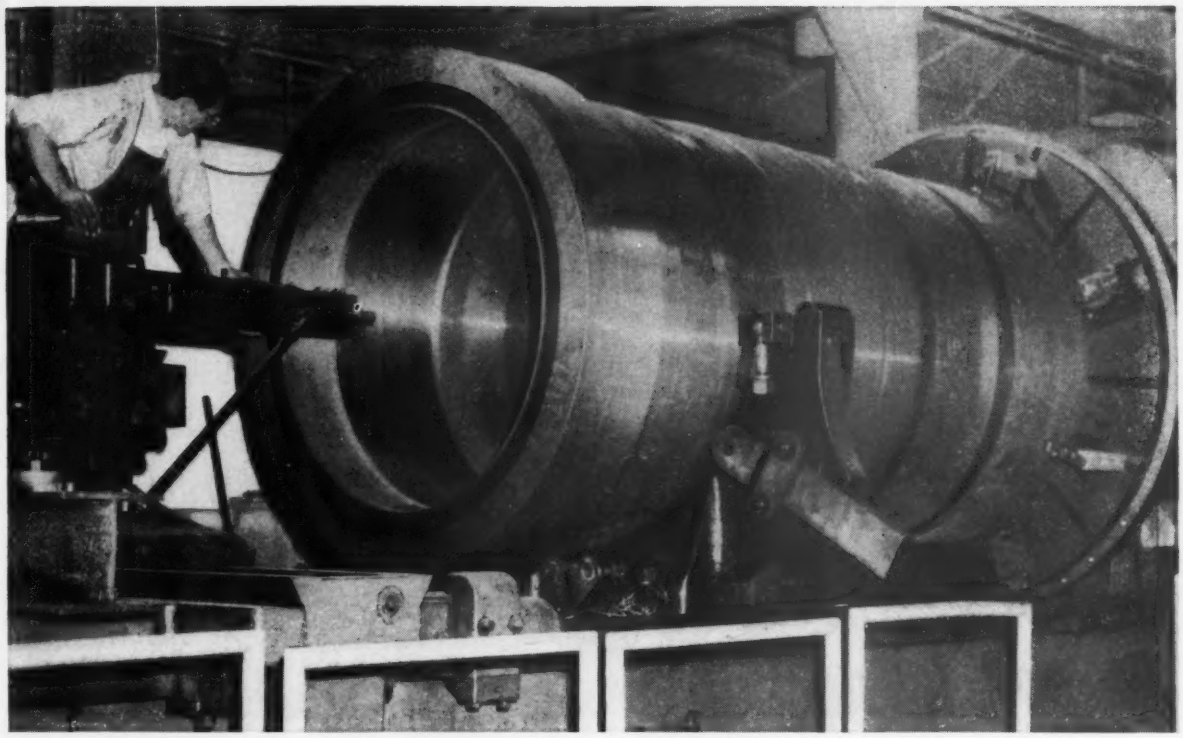
TACOMA 2, WASHINGTON

—an industry-wide organization devoted to research, promotion and quality control

DFPA TESTED QUALITY

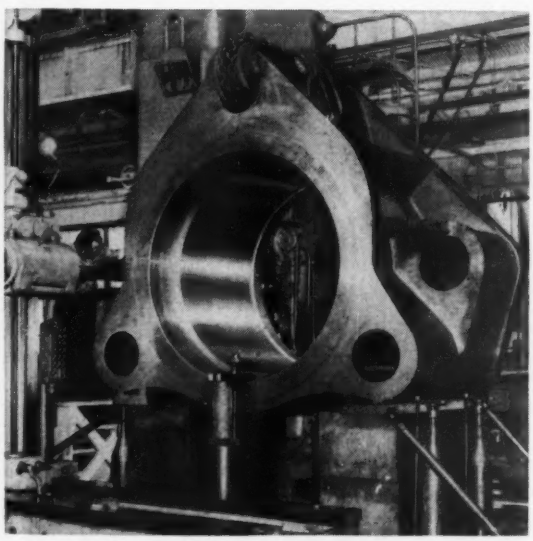
Always specify by DFPA grade-trademarks

. . . for more details, circle No. 12 on Reader Service Postcard



To bore the inside diameter of the cylinder, ingenuity was required in setting up the lathe with a long fixture.

85,000-lb. cylinder assembly produced by NATIONAL SUPPLY



About 2,300 lbs. of weld metal were used in this cylinder sleeve assembly. The central portion was machined from a 19,300-lb. forging. End plates and curved sections were made from 5″ and 3″ steel plate.

Wanted: Cylinder assembly for a 3,850-ton extrusion press. Weight: 85,000 lbs. Largest dimension: 9′ ½″. Operations required: forging, machining, welding and heat treating. National Supply's Torrance Plant got the job.

We made three cylindrical forgings, the largest of which weighed 41,000 lbs. After machining, we welded (submerged arc process) two to form the cylinder. The third forging became part of the sleeve into which the cylinder fits.

Because the largest forging measured 109½ inches from outside flange to the bottom of the bore, we had to develop a special long fixture for boring the I.D. The sleeve was also a special challenge—assembling it required 2,300 lbs. of weld metal.

Big, specialized steel products like this are the business of our Torrance Plant—the largest completely integrated machinery making plant in the West. The next time you need a special steel product, call us for a bid.

THE NATIONAL SUPPLY COMPANY

Subsidiary of Armco Steel Corporation

Torrance, California • Los Angeles Area

National Pressed Steel Forgings • Billets and Large Bars • Steel Castings and Special Machinery
Melting • Forging • Casting • Machining • Heat Treating • Assembling • Welding • Testing

. . . for more details, circle No. 13 on Reader Service Postcard

You can't see it... but it saves you MONEY

HIDDEN CLUTCH DOUBLES gear and motor LIFE...

SANDER-GRINDER

Especially Built for the Welder. Perfect tool for grinding down welds, casting fins and risers. Milwaukee's *exclusive* coaster brake clutch drive absorbs backlash and shocks . . . doubling gear and motor life. Large cyclonic fan and specially designed exhaust ports provide extra ventilating capacity . . . cooler running. Totally enclosed grit-proof, dust-proof trigger switch. Powerful, no-stall MILWAUKEE motor delivers a full 1½ HP *at the spindle* . . . 5000 RPM . . . ball and roller bearings throughout.

See Us at Booth No. 842 WESTERN METAL EXPOSITION . . . Los Angeles . . . March 16-20th

Find Us Fast In The Yellow Pages — Look under "Tools-Electric"

Milwaukee Electric Tool Corporation

2569 W. Olympic Blvd., Los Angeles 6, Calif.

. . . for more details, circle No. 14 on Reader Service Postcard

WESTERN MEETINGS

continued from p. 14 . . .

the Society of Packaging and Materials Handling Engineers; **Alvin C. Hamre,** E. C. Buehrer Associates, Inc., and representative from the Northern California Chapter of the American Material Handling Society; **William Conrad,** Acme Steel Co. and representative of the Central California Chapter of the Society of Packaging and Materials Handling Engineers; **Robert Sherry,** Martin Brothers Container and Timber Products Corp. and representative from the Central California Chapter of the Society of Packaging and Materials Handling Engineers; **Robert Morris,** Western Pacific Railroad Co. and representative from the Golden Gate Chapter of the Society of Packaging and Material Handling Engineers; and **Stanley Bober,** Roll-Rite Corp. and representative of the Northern California Chapter of the American Material Handling Society.

REGIONAL MEETING

A meeting of chapter presidents of Region VII, AMHS will be held the day preceeding the Stanford conference, announced Hiram Smith, Region VII director. Scheduled to attend the meeting will be heads of chapters from Denver, San Francisco, Los Angeles, and San Diego.

PANEL SUBJECTS have been announced for the Material Handling Institute traveling exhibit that will visit Los Angeles on May 6 and San Francisco on May 7.

Three panels will be held. They are (1) "Receiving and Shipping; (2) "Integrating Material Handling With Plant Facilities; (3) "Purchasing, Replacement, Maintenance Policies and Leasing vs. Purchase."

More details later.

●

A SPACE AGE BUSINESS conference—called the first of its type in the country — will be held March 11 at the St. Francis Hotel. Sponsoring the meeting is the San Francisco Chamber of Commerce.

Featuring leading California space experts, the conference will present in layman's language a progress report on the space program and its relation to the business man.

Dr. James H. Doolittle, chair-

. . . continued on p. 20

. . . for more details, adv. opp. pg., circle No. 15 on Reader Service Postcard →

Open Up New Avenues with Flash-Tite®

Now open for traffic—a big, broad one-way boulevard leading directly to more effective gummed taping! Its name? Flash-Tite Way!

Flash-Tite gummed tape is getting the green light in shipping departments all over the nation because it boosts production... lowers costs. The flash-grab formula means it grabs quicker...stays sticky longer. And Flash-Tite's wonderful pliability allows you to turn corners at full speed.

Get on the Flash-Tite Freeway! No winding curves! No rough stretches! No dead ends! Let us send you samples. We think you'll find Flash-Tite the most direct route to shipping room efficiency. For further information write: Crown Zellerbach, Distributor Sales Division, 343 Sansome Street, San Francisco, California.

Paper Products for all America!

CROWN ZELLERBACH DISTRIBUTOR SALES DIVISION

In Canada address product inquiries to Crown Zellerbach Canada Limited, Vancouver, B. C.

COMPLETE LINE OF *ACME* ROLLER CHAINS and ACCESSORIES Available at YOUR LOCAL INDUSTRIAL DISTRIBUTOR

Acme Chains are available nationally through reliable Authorized Distributors.

It is the basic policy of Acme Chain to sell its product through *Authorized* Distributors who have entered an agreement with the company to stock merchandise and service all Acme Products.

The quality of all Acme Products will continue to be — as it has been since the founding of the company — the highest quality that experience, materials, design, craftsmanship and facilities can produce.

Acme supports their Distributors with all the knowledge and assistance of their Engineering Department in an advisory and technical capacity.

Order Acme Chain from your Industrial Distributor with implicit confidence that you will receive prompt and efficient service at all times.

Write Dept. 2-P for new 100-page illustrated catalog, including new engineering section showing 36 methods of chain adjustments.

Call ***ACME*** for Service

Acme Chain Corporation
HOLYOKE MASSACHUSETTS

COMPLETE LINE OF ROLLER CHAINS AND SPROCKETS • DOUBLE PITCH CONVEYOR CHAINS • STAINLESS STEEL CHAINS • CABLE CHAINS • FLEXIBLE COUPLINGS • STANDARD AND SPECIAL ATTACHMENTS

. . . for more details, circle No. 16 on Reader Service Postcard

WESTERN MEETINGS

continued from p. 18 . . .

man of the board, Space Technology Laboratories, Los Angeles, will address the luncheon session. His subject will be "Our Investment in Space."

Other experts taking part will be **Dr. Ruben Mettler,** executive vice president, Space Technology Laboratories; **Dr. Weldon Gibson,** associate director, Stanford Research Institute; **Dr. Alfred J. Eggers, Jr.,** Ames Research Center; **Willis Hawkins,** assistant general manager, Weapons Systems, Lockheed Guided Missiles Division, Sunnyvale; and **Carl W. Miller,** manager, Marine, Transportation & Aviation Facilities Sales, Pacific Coast region, Westinghouse Electric Corp.

Reservations at $8.00, including registration and luncheon, can be made by calling the San Francisco Chamber of Commerce, EXbrook 2-4511, Ext. 58.

Photo File

GOLDEN GATE SPHE — Pictured at a recent meeting were (left to right): **Stuart Landoc,** president, Central Calif. SPHE; **Breo Freeman,** Specification Packaging Engineering Corp. (speaker for the night); **W. C. G. Brouwers,** president, Golden Gate chapter; **W. L. Dalton,** program chairman, Golden Gate chapter.

●

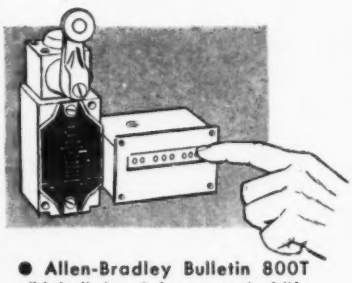
NO. CALIF. AMHS—It was wives' night at a recent AMHS meeting and pictured at the head table are (left to right): **Ray Perin,** Perin Co., Inc., program chairman; **Mrs. Hiram Smith; Hiram Smith,** Matson Terminals, Region VII director; **Mrs. Virginia Perin; Ellis Woolley,** Naval Supply Center, chapter pres.; **Mrs. Woolley; Robert Griffin,** Robert H. Griffin Co., special events chairman.

●

PROGRAM COMMITTEE—Committee members for the Fourth Annual Industrial Materials Handling and Packaging Conference pictured are (left to right): **Stanley Bober,** Roll-Rite Corp., chairman; **Robert Stevens,** Fibreboard Paper Products Corp., steering committee chairman; **Bradford W. Brown,** packaging consultant; **Clyde Jacobs,** Crown-Zellerbach Co.

Allen-Bradley is not satisfied until Limit Switch Life runs into

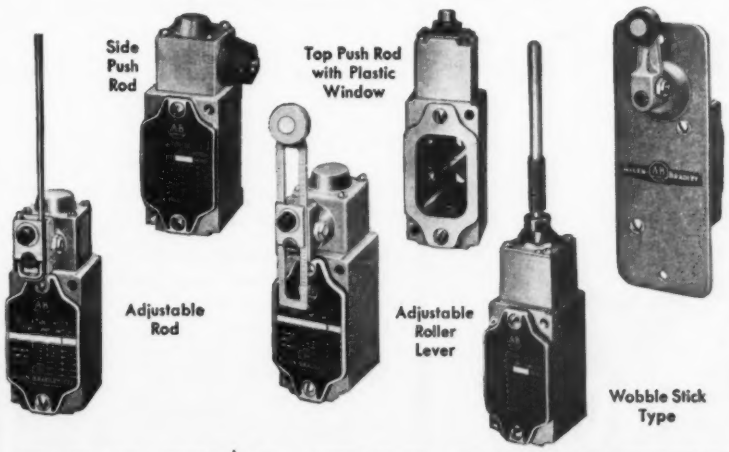
MANY MILLIONS OF OPERATIONS

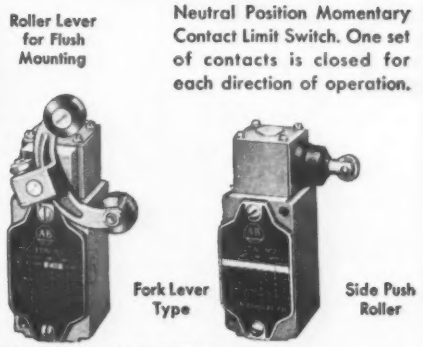


● Allen-Bradley Bulletin 800T oiltight limit switches on typical life tests have run many millions of operations. Write for complete information on the Allen-Bradley line of quality limit switches for every industrial application.

Here are some new—and some old—Allen-Bradley oiltight limit switches—all built to give you extra millions of trouble free operations. Their switch bodies and operating heads are both sealed. Oil, dirt, and metal chips cannot enter and foul the contacts or cause sluggish operation of the momentary contact mechanism. Double break, silver alloy contacts never need maintenance. The snap action switch is positive insurance against any reduction of the contact pressure as the "trip point" is approached. This means less chance for chatter and arcing of relays, contactors, or starters operated by the limit switch—and prolonged trouble free contact life for the limit switch itself.

The Allen-Bradley line of limit switches is complete. Illustrated are only a few variations.





Neutral Position Momentary Contact Limit Switch. One set of contacts is closed for each direction of operation.

ALLEN-BRADLEY | QUALITY MOTOR CONTROL

Allen-Bradley Co., 1323 S. First St., Milwaukee 4, Wis. • In Canada—Allen-Bradley Canada Ltd., Galt, Ont.

CONSULT YOUR LOCAL ALLEN-BRADLEY REPRESENTATIVE

ALBUQUERQUE
A & A Supply Co., 114 Morningside Drive, N. E., Tel: ALpine 6-0307
DENVER 5
Young Electric & Mfg. Co., 2134 Curtis St., AComa 2-4841
LOS ANGELES 23
Allen-Bradley Co., 1264 S. Boyle Ave., Tel: ANgelus 9-9421
PHOENIX
Edward P. Weller & Co., 1902 E. Rovey Ave., Tel: AMhurst 6-3188
PORTLAND 14
J. A. Tudor & Associates, Inc., 1004 S. E. Belmont St., Tel: BElmont 2-1188
SALT LAKE CITY 10
Stevens Sales Co., 1482 Major St., P. O. Box 2338, Tel: INgersoll 7-5489
SAN DIEGO 1
James A. Setchell, 301 W. "G" St., Tel: BElmont 3-3981
SAN FRANCISCO 10
Campbell & George Co., 1601 Cortland Ave., Tel: Mission 8-1236
SEATTLE 1—J. A. Tudor & Associates, Inc., 2605 Western Ave., Tel: MUtual 2-7444

. . . for more details, circle No. 17 on Reader Service Postcard

Western Meeting Reports

. . . Continued from page 20

MANNED SPACE SHIPS, new developments in rocket propellants and the latest jet transport planes will be featured topics at the 1959 Aviation Conference in Los Angeles on March 10-12.

Experts will review current and projected efforts to place a man-carrying rocket in space, supply it, and bring its occupant back to earth. Among the problems they will consider are how to supply space ships with power for radio and other auxiliaries, the relative merits of nuclear and chemical fuels, and how to use satellites as staging platforms for journeys into space.

A special discussion on March 11 will feature four test pilots discussing the topic "The Test Pilot's Views on Space Ventures." Chairman of the discussion will be **A. Blackburn,** President of the Society of Experimental Test Pilots.

In addition to daily sessions on satellites and rocket propulsion there will be a series of technical talks on the design and operation of new jet transport planes. Topics will include suppression of noise, passenger comfort, and cabin conditioning.

Cooperating in sponsorship of the conference are the Los Angeles section of the American Society of Mechanical Engineers and the San Diego, Sacramento, Central and Southern California sections of the American Rocket Society.

Persons interested in attending the conference may request copies of the final program and registration forms from the Meetings Department, ASME, 29 West 39 Street, New York 18, New York.

•

THE 7TH NORTHWEST CONFERENCE ON QUALITY CONTROL, presented by the Portland chapter of the American Society for Quality Control, will be held Friday and Saturday, April 3 and 4, at the Oregon Museum of Science and Industry.

Guest lectures will be given by: **Dr. Harry Romig,** Hoffman Laboratories; **Dr. Louis DeAlcues,** Mary Ellen Foods; **Melvin L. Snow,** Westinghouse Atomic Power Div.; **W. E. Smith,** National Cash Register; **O. R. Weaver,** Phillips Chemical; **Leo Aroian,** Hughes Aircraft . . . and many other speakers who are outstanding in industrial quality control.

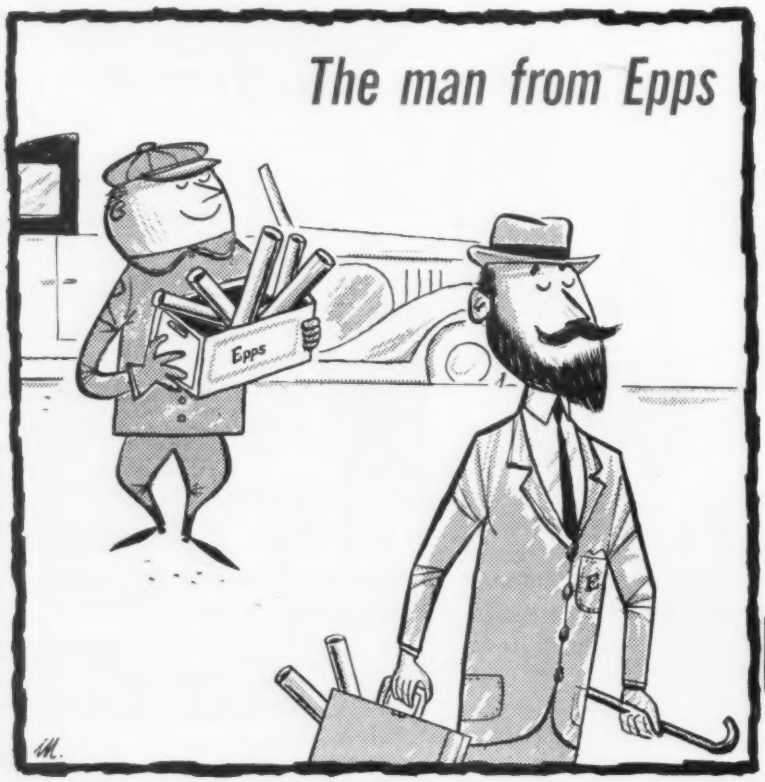
Further information may be obtained from A.S.Q.C., Post Office Box 2001, Portland 14, Ore.

•

NEW OFFICERS OF THE Electrical Maintenance Engineers Association recently installed include: President, **Charles M. Tabor,** Larsen-Hogue Electric Co.; First Vice President, **Paul H. Henrichs,** Southern California Edison Co.; Second Vice President, **Frank R. Tharp,** Electric Machinery Maintenance Co.; and Secretary-Treasurer, **William E. Cline,** General Electric Co.

•

THE WESTERN PINE ASSN. will meet March 11-14 at the Sheraton Palace Hotel, San Francisco. Further information may be obtained from **S. V. Fullaway,** Secretary-Manager, Yeon Building, Portland, Ore.



I'm Commodore Brighthead, old chap. Awfully glad to greet you. I'd jolly well like to tell you all about our high quality steel tubing — and how we can help you eliminate a good deal of your production time costs.

Really, old fellow, we deal ONLY in steel tubing . . . so we have only YOU in mind when we make our mill runs. Our customers are our most important product.

We're a bit of all right on service, too. After all, we're the ONLY mill in Los Angeles with a complete floor stock of welded steel tubing available for immediate delivery.
I guess, old boy, you can understand why our customers are so EPPServescent.

Bernard **EPPS** & Co.

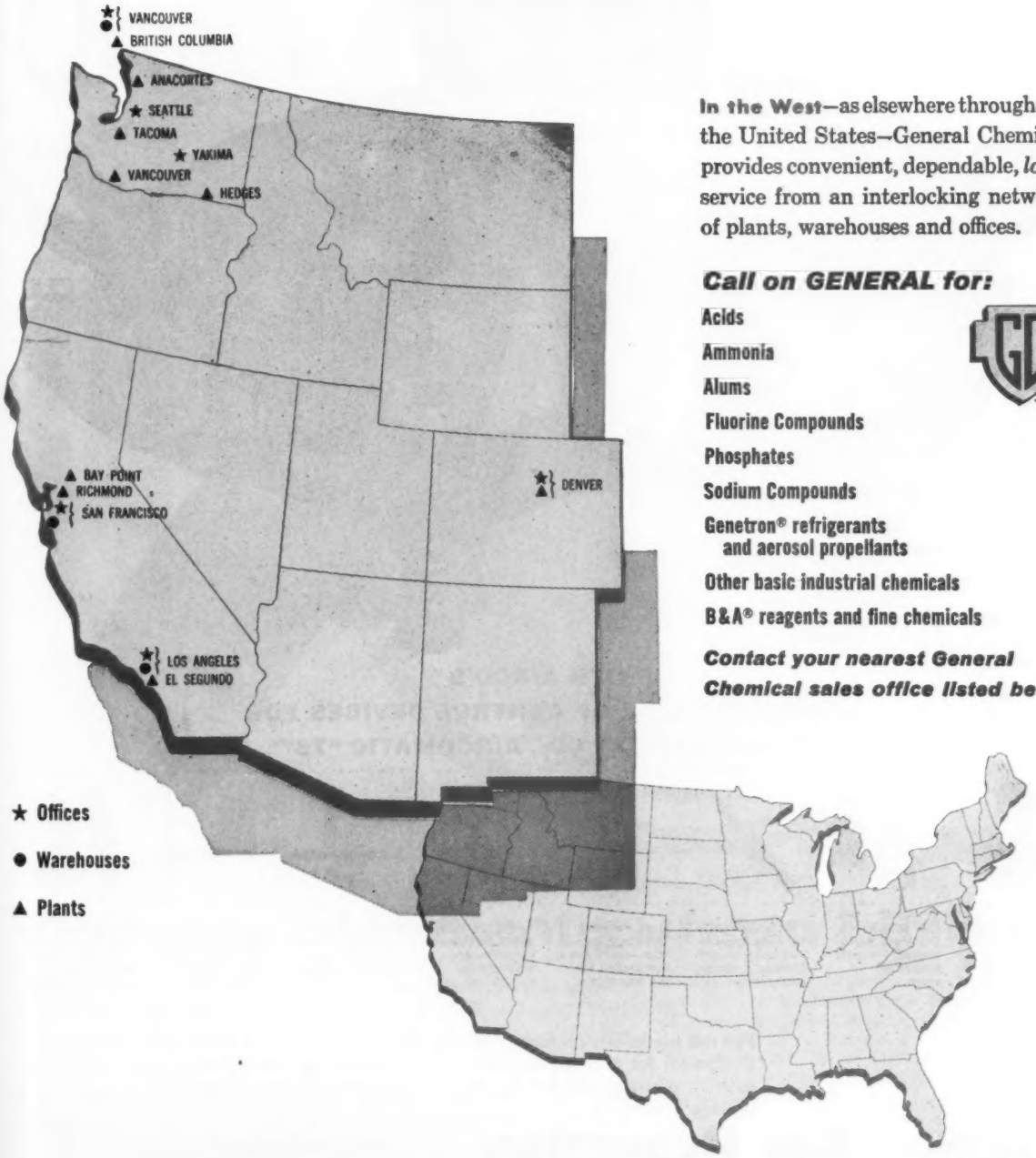
EPPS STEEL *Tube*
Manufacturing Division

2332 East 38th St.
Los Angeles 58, California
Phone LUdlow 8-2281

. . . for more details, circle No. 18 on Reader Service Postcard

General Chemical Service

is where you are!



In the West—as elsewhere throughout the United States—General Chemical provides convenient, dependable, *local* service from an interlocking network of plants, warehouses and offices.

Call on GENERAL for:

Acids
Ammonia
Alums
Fluorine Compounds
Phosphates
Sodium Compounds
Genetron® refrigerants and aerosol propellants
Other basic industrial chemicals
B&A® reagents and fine chemicals

Contact your nearest General Chemical sales office listed below

Allied Chemical

Basic Chemicals for American Industry

GENERAL CHEMICAL DIVISION

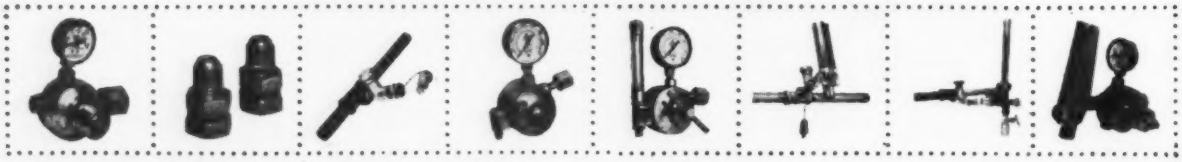
40 Rector Street, New York 6, N. Y.

San Francisco 4, Cal.	Los Angeles 5, Cal.	Seattle 1, Wash.
235 Montgomery St.	2999 West Sixth St.	1326 5th Ave.
YUkon 2-6840	DUnkirk 8-3201	MAin 3-5287

In Canada: Allied Chemical Canada, Ltd. • Vancouver, B. C.

. . . for more details, circle No. 19 on Reader Service Postcard

WITH AIRCO'S
COMPLETE LINE OF CONTROL DEVICES FOR
ARGON, HELIUM, CO_2, AIRCOMATIC "75"*



Single-Stage Fixed Pressure Regulator Low in cost . . . sturdy. No flow rate tampering.

Flow Adapter— Exact gas flow needed. Prevents tampering . . . saves.

"B" Station Valve for Flow Adapter —reliable shutoff. Compact, sturdy, versatile.

Fixed Pressure Two-Stage Regulator—exact gas flow needed. For two operations.

Two-Stage Flowmeter Regulator—complete flow coverage for virtually all uses.

Station Flowmeter —complete coverage. Low cost . . . extremely rugged.

Dual Range Flowmeter—complete coverage. Versatile, excellent readability.

Single-Stage Flowmeter Regulator— Rugged, compact. No heater required for CO_2.

*75% Helium, 25% Argon

For full particulars on how to specify the most economical Airco Gas Equipment for your application, see your Authorized Airco Dealer, or write to Airco direct. Ask for the new Gas Flow Control Equipment Catalog. It's free.

AIRCO®

AIR REDUCTION PACIFIC COMPANY

SAN FRANCISCO • LOS ANGELES • PORTLAND • SEATTLE
Bakersfield • Burbank • Emeryville • Fresno • Inglewood
Phoenix • Sacramento • San Diego • Stockton • Tacoma

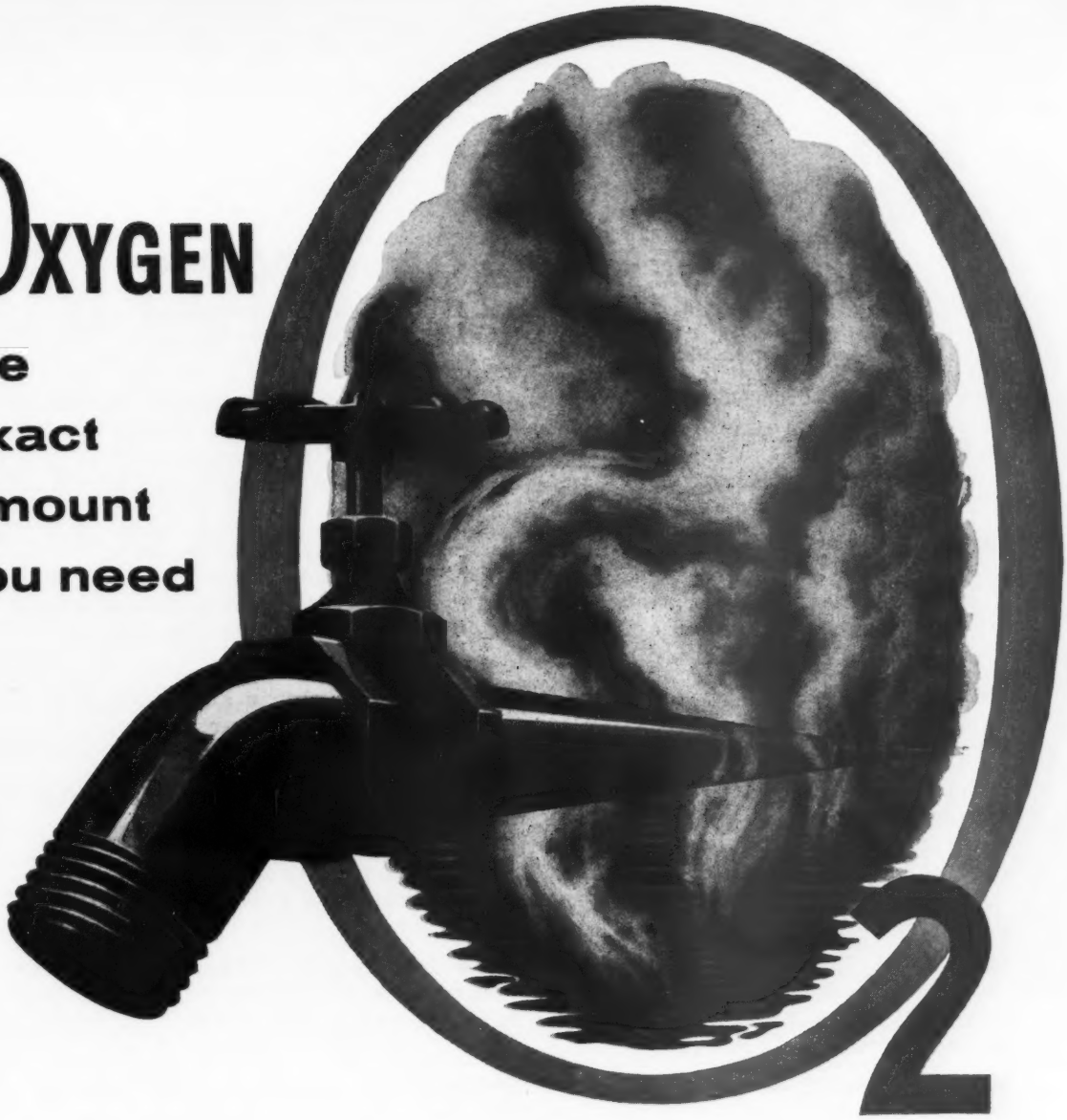
Western Headquarters for Oxygen, Acetylene and Other Gases . . . Carbide . . . Gas Welding and Cutting Machines, Apparatus and Supplies . . . Arc Welders, Electrodes and Accessories

Air Reduction Pacific Company is a division of Air Reduction Company, Incorporated. Principal products of other divisions include: PURECO — carbon dioxide — gaseous, welding grade CO_2, liquid, solid ("DRY-ICE") • OHIO — medical gases and hospital equipment • NATIONAL CARBIDE — pipeline acetylene and calcium carbide • AIRCO CHEMICAL — vinyl acetate monomer, vinyl stearate, methyl butynol, methyl pentynol, and other acetylenic chemicals • COLTON — polyvinyl-acetates, — alcohols, and other synthetic resins.

. . . for more details, circle No. 20 on Reader Service Postcard

OXYGEN

the exact amount you need



You get it instantly—from LINDE

You have no worries whatever about an ample, dependable supply of oxygen for your process when you buy oxygen from LINDE. Full responsibility for production, transportation, and storage at your plant is assumed by LINDE.

Tonnage oxygen. Large amounts of liquid or gaseous oxygen can be supplied from a full-scale oxygen production unit—built and maintained by LINDE—directly to your plant. You pay only for the oxygen you use, at a price guaranteed by LINDE, with no capital investment on your part.

For varying needs. A DRIOX oxygen storage unit provides a continuous flow of liquid oxygen, or converts it automatically to gas. Constant pressure is maintained, even while the unit is being replenished. Or you can get LINDE oxygen in a single flask, a cylinder, or banks of cylinders.

Take advantage of LINDE's 50 years of development and service in the industrial gas field! Write, phone, or wire Dept. WI-3, LINDE COMPANY, Division of Union Carbide Corporation, 22 Battery Street, San Francisco 6, Calif. Offices in other principal cities. *In Canada*: Linde Company, Division of Union Carbide Canada Limited.

When you need Oxygen—call LINDE!

Linde TRADE-MARK

UNION CARBIDE

The terms "Linde," "Driox," and "Union Carbide" are registered trade-marks of Union Carbide Corporation.

. . . for more details, circle No. 21 on Reader Service Postcard

What's New

IN STEEL FROM STOCK

New developments will help give you Increased Value in Buying Metals from Ryerson during 1959. Below are just some of the new additions to Ryerson's comprehensive stocks and services.

NEW FASTER MACHINING TUBING...Ledloy® 170—fastest machining steel tubing ever produced, average speed of 170 s.f.m. And only Ryerson has it for shipment from stock. Users report increases of 25% in productivity... longer tool life...improved finish. Sizes available to date from 1" to 2½" O.D. with maximum ⅜" wall thickness.

NOW EVEN FASTER MACHINING LEDLOY BARS...new Ledloy 375 bars boost machinability to record averages of 375 s.f.m. Large stocks of this new steel supplement Ryerson stocks of regular Ledloy 300 free-machining steels to give you widest selection. Available from Ryerson stocks in rounds from ¼" to 1", hexes from ¼" to ⅝".

NEW ALUMINUM STOCKS...are being added in Ryerson plants at Cleveland, Philadelphia and Los Angeles. Aluminum stocks at other Ryerson plants have also been greatly expanded.

NEW STOCKS OF T-1 ALLOY PLATES...in two types: to 321 minimum BNH and to firebox quality specs. "321" gives maximum resistance to impact and abrasion. Five sizes available from 3/16" through ⅝". "Firebox" is for applications requiring high strength and toughness...meets ASME code case 1204-3 for pressure vessels. Available in nine sizes from ¼" through 2". Both types offer good weldability.

STAINLESS EXTRUDED ANGLES...now available from Ryerson. They offer better surface and resultant lower polishing costs...cross-section tolerances less than half those of rolled angles for better forming into rings...no increase in price over rolled angles.

INCREASED VALUE IN STAINLESS FROM RYERSON...even though your application may not demand it in every case, you get the ultimate in specification controls when you order stainless from Ryerson—an important increased value without increased cost. Examples: in addition to chemistry specs for Types 304 and 316, you get the added value of controlled mechanical properties and Brinell hardness—and corrosion resistance assured by actual test.

STAINLESS HEADS—NATION'S LARGEST STOCK BY FAR...Ryerson stocks now include every requirement for ASME flanged and dished heads in Types 304, 304L, 316 and 316L in a wide range of gauges and sizes.

RYERSON STEEL®

Member of the INLAND® Steel Family

NATION'S MOST COMPLETE SERVICE ON STEEL... ALUMINUM... PLASTICS... METALWORKING MACHINERY

SERVICE CENTERS IN PRINCIPAL CITIES COAST TO COAST

JOSEPH T. RYERSON & SON, INC., LOS ANGELES—Plant: 4310 E. Bandini Blvd. Mail: Box 3817, Los Angeles 54. Phones: ANgelus 2-6141, from San Diego BEImont 4-7582. SAN FRANCISCO—Plant: 65th & Hollis Sts., Emeryville. Mail: Box 8108, Emeryville, California. Phones: OLympic 3-2933, DOuglas 2-4211. Seattle—Plant: 1200 4th Ave., South. Mail: Box 3525, Seattle 24. Phone: MAin 4-2300. SPOKANE—Plant: North 207 Freya St. Mail: Box 2158, Spokane 10. Phone: KEystone 5-1581.

. . . for more details, circle No. 22 on Reader Service Postcard

OUTDOOR PRODUCTION

Taking advantage of mild Western climate and advanced engineering and maintenance ideas, Linde Co. is building this highly efficient outdoor plant . . .

EXPOSED—Valves and connections on this separation tower are exposed to weather. But special designs and material prevent trouble.

OUTDOOR PRODUCTION is taking a place beside "outdoor living" in the West.

The latest move toward outdoor production was taken by Linde Company, Division of Union Carbide Corp., which is constructing a 300 ton-a-day liquid oxygen and nitrogen producing plant at Pittsburg, California.

Taking advantage of mild Western climate and latest engineering, construction and maintenance techniques, the plant is as much outdoors as any plant can be. Before going into details, here is a thumbnail sketch of how the plant will operate:

Air from the atmosphere is compressed to a high pressure, then cleaned, dried, refrigerated and liquefied.

Massive separation equipment (employing fractional distillation techniques) is used to produce liquid oxygen and nitrogen. The liquid products are then stored in twin spheres, each having a storage capacity of 25 million cubic feet.

Sound simple? There's a lot of advanced engineering, construction and maintenance features going into the new facilities. Thanks to more than half a century of continued research, development and operation, Linde has been able to design this plant which is aimed not only toward peak efficiency—but to operate outdoors.

The plant is being built under the supervision **E. P. Shepherd,** who has constructed plants for Linde in all parts of the country.

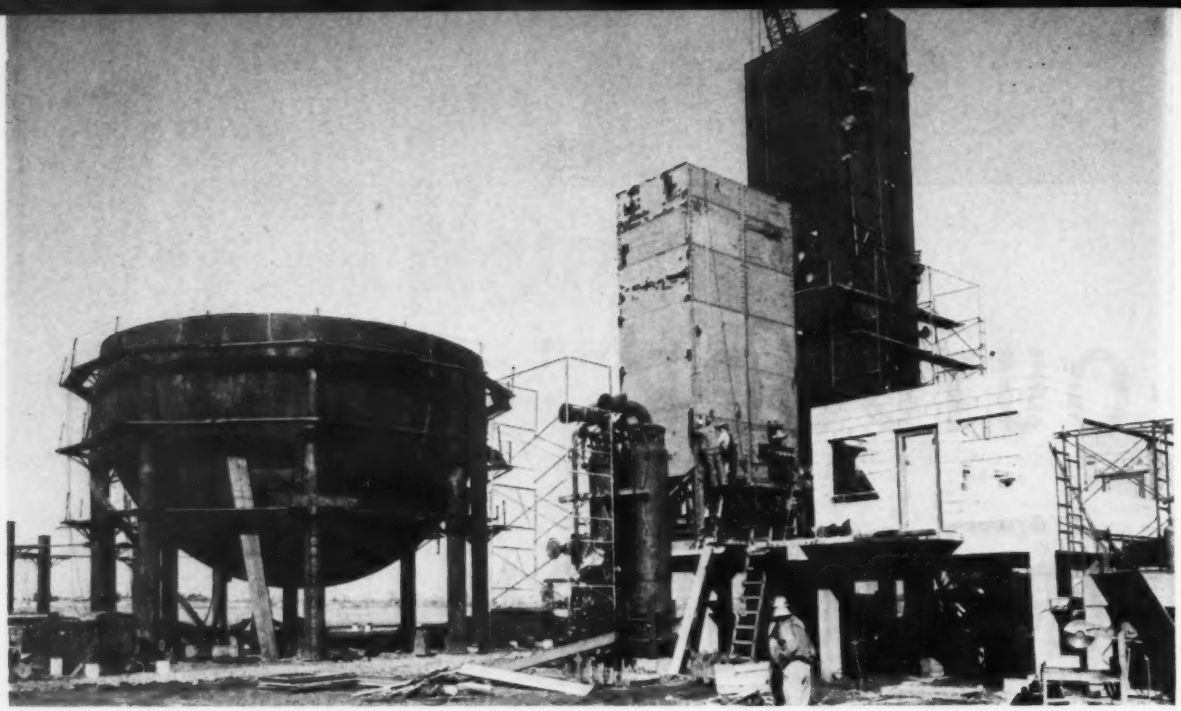
"Abandon old ideas for new . . ."

Shep says, "When plans were being prepared for this plant, two factors were in our favor: (1) We had advanced engineering know-how and construction techniques to the point where we could abandon many old ideas and place sure bets on new ones; (2) We could take advantage of the mildness of the Western climate to carry out many new concepts—all of which pointed toward outdoor operation.

"Take the compressors, for instance. These giant machines with a capacity of about 300,000 cu. ft. per hr. can operate in open air and are run by motors in weatherproof enclosures. So why worry about a little rain? They operate just as well inside or outside."

Another feature about these compressors is that they are mounted on a slab of concrete which is isolated from the rest of the plant. This gives the dual advantage of reducing noise and vibration—especially important in the case of sensitive instruments.

Shep then points out the way his process piping is laid out. "We built the operating deck above the base floor. This makes it possible for us to lay out our pipes in a gallery (side by side) above ground and not stack them on top of each other in a trench. The pipes are all accessible for easy maintenance when necessary; this construction feature eliminates troublesome 'blind spots' for repair work. Also, the cleaning of



OUTDOOR PRODUCTION SHAPES UP — This construction photo shows (from left): spherical storage tank, heat exchanger, air separation column. Building at right will house instruments and operator, giving him a full view of all equipment.

the gallery can be done easily with a hose. With a trench you always have the problem of cleaning out debris that accumulates from day to day."

The piping which is used resists corrosion and has high strength, low temperature factors. Most of the electrical conduit is also in the pipe gallery. The insulation is all weatherproof.

Unique outdoor construction . . .

The air separation equipment is a unique example of outdoor construction. The equipment housing is built of carbon steel plate. Near the bottom of the housing on the operating face — where most valves and connections are exposed—aluminum sheet panels replace the steel plate. This is necessary because of the extreme cold temperature of liquid passing through exposed valves and connections producing frost and condensation, which would ruin the paint in short order.

The rest of the housing is painted with a rust inhibitive prime coat applied after the steel plates have been flame-cleaned with an oxy-acetylene torch. Then a coat of weather-resistant enamel is painted over the prime coat. Studies are now being made as to the feasibility of using epoxy-resin base paint on these units.

How do the exposed valves and fittings take the weather?

"Just fine," beams Shep. "Virtually all of the valves and fittings are high strength, low-temperature alloys, such as stainless steel, forged bronze, copper or other non-ferrous material. The special packing used requires no lubrication (oil and oxygen don't mix). No, we don't anticipate any trouble with these valves and fittings."

How do you get to the valves and fittings that are way up on the side of the air separation column?

"See the scaffolding over there? That's the framework for a stairway which will be placed right next to the column. Then we're going to cover the sides of the scaffolding with aluminum so a man can work up there with good shelter. While we could leave the scaffolding uncovered it would be mighty uncomfortable for a man to be adjusting those valves in a pelting rain."

Tanks are first of their size

The huge liquid storage tanks themselves are somewhat of a construction wonder, and the first of their size in the nation. Each tank is composed of two spheres: an outside steel shell which measures 50 ft. in diameter, and a tank within which holds the liquid oxygen or nitrogen. The two vessels are insulated from each other with a specially developed insulation material. This is necessary because of the extreme cold temperatures (down to 320° F. below zero) of the liquid products.

Shep adds: "The spherical shape of these liquid storage tanks gives us considerable savings in space and permits much easier loading and unloading of our liquid products. This spherical design also lends itself to modern metalworking techniques for fabrication, such as Heliarc welding.

"Our storage tanks are designed and situated so that our liquid tank trucks and rail tank cars can nuzzle right up for loading. There will be enough loading capacity to handle several tank cars or tank trucks at a time.

"Speaking of trucks," comments Shep, "Linde already has the largest truck fleet for transporting liquid oxygen and nitrogen in the West—and we are adding to it. These vehicles, the largest of which carry the gaseous equivalent of 470,000 cu. ft. of product, are built so that they have the right load, axle weight, etc. for California State Law. This will permit us to carry full payloads at all times.

"Our 1,000,000-cu. ft. railroad tank cars back up our liquid truck fleet and we should really be able to get deliveries to customers on time and in the quantities needed."

The construction of the cooling

tower is also unique. This tower is of parabolic construction to allow for more aereation and more effective cooling. The induced draft fans on top have redwood sidings (weather resistant) and the louvers have transit sidings. The tower is also equipped with ceramic distribution nozzles. All these features and choice of materials will result in greater safety, efficiency and lower upkeep.

The cooling tower will handle 8 to 10,000 gallons of water a minute. Water is circulated down through the cooling tower in a closed system. Water which is lost by evaporation (several hundred gal. a minute) will be piped in from the Contra Costa canal through a mile-long pipeline. Two turbine pumps will circulate the water from the tower to coolers and back to the tower.

Features for overall efficiency . . .

Norm Harris steps into the story at this point. Norm, who has been operating superintendent at Linde's Berkeley plant, will become operating superintendent at Pittsburg.

"You know," muses Norm, "the operation of this new plant will be a radical change when compared to plants producing similar products. Both the construction and maintenance features contribute to the overall efficiency of this plant. For example, the control room is elevated so the operator can see all the important components of the plant. The windows will be tinted so he has clear, glare-free visibility at all times. And not only will he have both visual and auditory inspection, but a complete set of instruments and gages will keep him posted on the operations of all equipment. The air in the room will be conditioned by a heat pump which will keep it at the right temperature at all times of the year. This will not only assure maximum comfort for the operator, but will assure that the sensitiye instruments will not be affected by temperature changes."

Gantry crane is maintenance tool . . .

One of the handiest maintenance devices in the plant is a 7½-ton gantry crane that straddles the compressor. The crane track extends to a loading dock so that the crane can pick up equipment and set it in place.

But the main advantage of the crane is that it can be positioned over any one of the compressors and used in maintenance work. And if it is raining, a tarp can be stretched over the top of the framework to provide shelter for maintenance personnel.

Maintenance in two phases . . .

"Maintenance is broken down into two phases," explains Norm. "First we have our daily and weekly routine maintenance program, and secondly a periodic preventive maintenance schedule.

"Every day our maintenance man will have a regular routing which will include both a visual and manual inspection of equipment, gages, etc. He'll see if the motors are running at peak efficiency, the compressors operating properly, and that all instruments are responding accurately.

"Then we'll have him on a painting program that serves two purposes: (1) keeps the paint and outdoor housekeeping of the plant spic and span and prevents corrosion; (2) keeps the man next to and working on the equipment. In this way he will become increasingly familiar with the equipment and will be able to detect the slightest trouble. We will also have a rainy day program that will keep up our maintenance even during foul weather."

Preventive maintenance program . . .

How about the periodic preventive maintenance program?

"We will shut down the plant at regular intervals to perform major inspection and repair work. Obviously these will be planned shutdowns, organized to perform a maximum amount of work in a minimum period of time. We are going way out of our way to anticipate operating problems and to take steps that will reduce operating outages to an absolute minimum.

"Don't forget the observation tower office that the operator sits in. He'll have all the gages in front of him and he'll be able to see all the equipment operating. Control equipment has been centralized so that any single piece of machinery can be shut down by pressing a button, or for that matter the entire plant can be taken 'off the line' in the same manner."

What happens if something does go wrong?

"The maintenance people and operator will have strict procedures to follow. The construction and design of the plant for outdoor operation lend to its safety factor, plus the fact that just about every safety feature Linde has adopted in its more than 50 years of operating experience is incorporated in this plant.

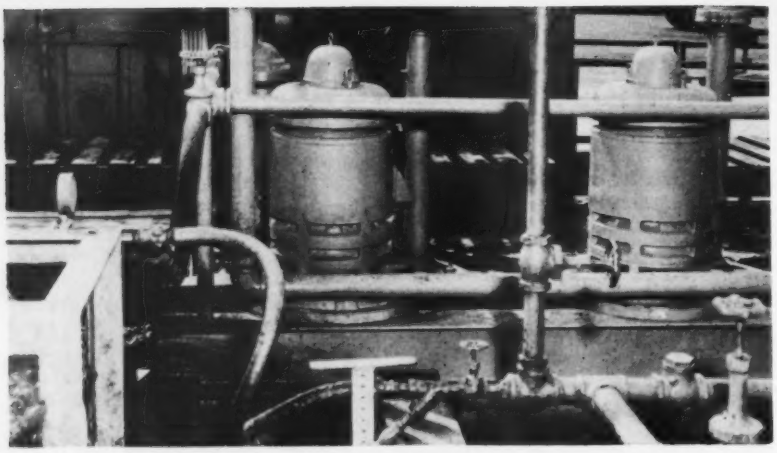
"Of course, the plant is no safer than the people who work in it and operate it. Linde has a regular and continuing safety program aimed at training our people to work safely. Equipment such as safety shoes, goggles and hard hats must be worn by every employee. All of the foregoing add up to an operation that is as safe as we can make it."

The first stage of the new plant is scheduled to go into operation around June. This section will have a capacity of 115,000,000 cu. ft. of oxygen and nitrogen a month. The second stage, with a capacity of 105,000,000 cu. ft. a month, is scheduled to go on stream in October of this year.

And the opening of this plant will advance a unique Western concept—OUTDOOR PRODUCTION.

E. P. SHEPHERD—kneels on base floor and shows how pipes are hung in a gallery under operating floor. This allows easy maintenance.

NORM HARRIS—shows how valves and fittings are exposed for easy access to operators. Aluminum sheets will be used here to prevent any corrosion.



VERTICAL CENTRIFUGAL PUMPS circulate water in tomato flume . . .

How you can use pumps to boost production

EVER THOUGHT OF pumps as production tools?

Hunt Foods and Industries, Fullerton, Calif., does. It uses pumps as an integral part of its production operation. Here's how:

To transport tomatoes from the receiving area to the plant and apportion them to the five production lines, Hunt engineers utilize a stream of water in a concrete flume 3 ft. wide, 2 ft. deep and about 750 ft. long. To keep water flowing through the flume, they installed four identical vertical centrifugal pumps, each rated at 3000 gpm. at a 25-ft. head and each driven by a 25 hp. hollow-shaft motor.

Two of the units are located at the start to take water from a sump and pump it into the flume. The other two take water at the end of the flume after the tomatoes have been discharged and the water screened and return it to the sump through a 16-in. pipe. Two pumps—one at each end—usually are adequate to handle the load.

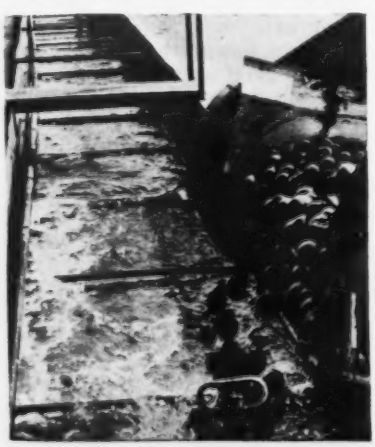
As tomatoes are needed for processing, they are dumped into a water bath. They then are picked up by a belt and cleaned by a pressure water spray supplied by a 1200 gpm. two-stage turbine pump close-coupled to a 7½ hp. motor. The tomatoes drop off the end of the belt into the flume and are carried to the plant by the flowing water.

The four 3000 gpm. centrifugals that handle flume water are automatically controlled to correspond with the volume of produce going into the flume.

There are a number of advantages in the use of water as a carrier. First, the water serves to cushion and protect the product. Also, the vegetable is washed in transit. A major advantage of the system is the improved method of dividing the produce among the five production belts.

The conventional system employs metal gates to direct the flow from belt to belt. This works well with cans but in dealing with fragile vegetables like tomatoes, contact with the metal gate causes bruises and loss of juice.

TOMATO FLUME is used to carry tomatoes via water to the plant.



Hunt's system is to direct the flow of tomato-bearing water into an open suction header from which it flows unimpeded into five equal rubber-faced channels where the tomatoes are picked up on belts. The water drops through each belt into an individual sump, then through screens to a return header where it is picked up by the 3000 gpm. pumps and sent through the 16-in. line to complete the closed circuit.

The flow of water and tomatoes into each of the five channels can be controlled by regulating discharge from each sump. In effect, the tomatoes in their water cushion are siphoned out of the suction header and there are no gates to damage them. The conveyor belts carry the produce to the inspection department where women remove any imperfect tomatoes before they reach the processing equipment.

Water (and the pumps that move it) plays other important roles at Fullerton, primarily for process cooling. Two cooling towers are utilized at the plant. Water from a large new tower is used primarily to cool the retorts. It is handled by a two-stage turbine pump rated at 2500 gpm. at a 100-ft. tdh. and driven by a 75-hp. motor.

A similar turbine pump with a 60-hp. vertical motor pumping 1000 gpm. at a 210-ft. head has the dual job of boosting water over the tower at peak periods and also pressurizing the small portion of hot water not cooled in the tower but, rather, sent around the plant to meet specific heating needs. A thermostatic proportioning valve between the pumps and the tower is used to determine how much water will go over the tower for cooling and how much will go directly back into the plant.

The smaller tower, which handles all other plant water cooling chores, uses an 8-in. split-case pump for its booster. The suction on this 60-hp. unit is taken from a large sump directly under the vacuum cookers used in preparing tomato paste.

A pair of 6 x 8-in. split-case pumps with 75-hp. motors recirculate the cooled water. Each of these pumps operates at 1200 gpm. at a 160-ft. tdh.

Most of the pumps used in these operations are manufactured by Fairbanks, Morse & Co.

METALS in the WEST

32 METALLURGY

34 WELDING

37 BRAZING

39 CASTING

41 MACHINING

46 FINISHING

48 BONDING

49 FORGING

53 EXTRUSIONS

62 BEST METALS MANUALS

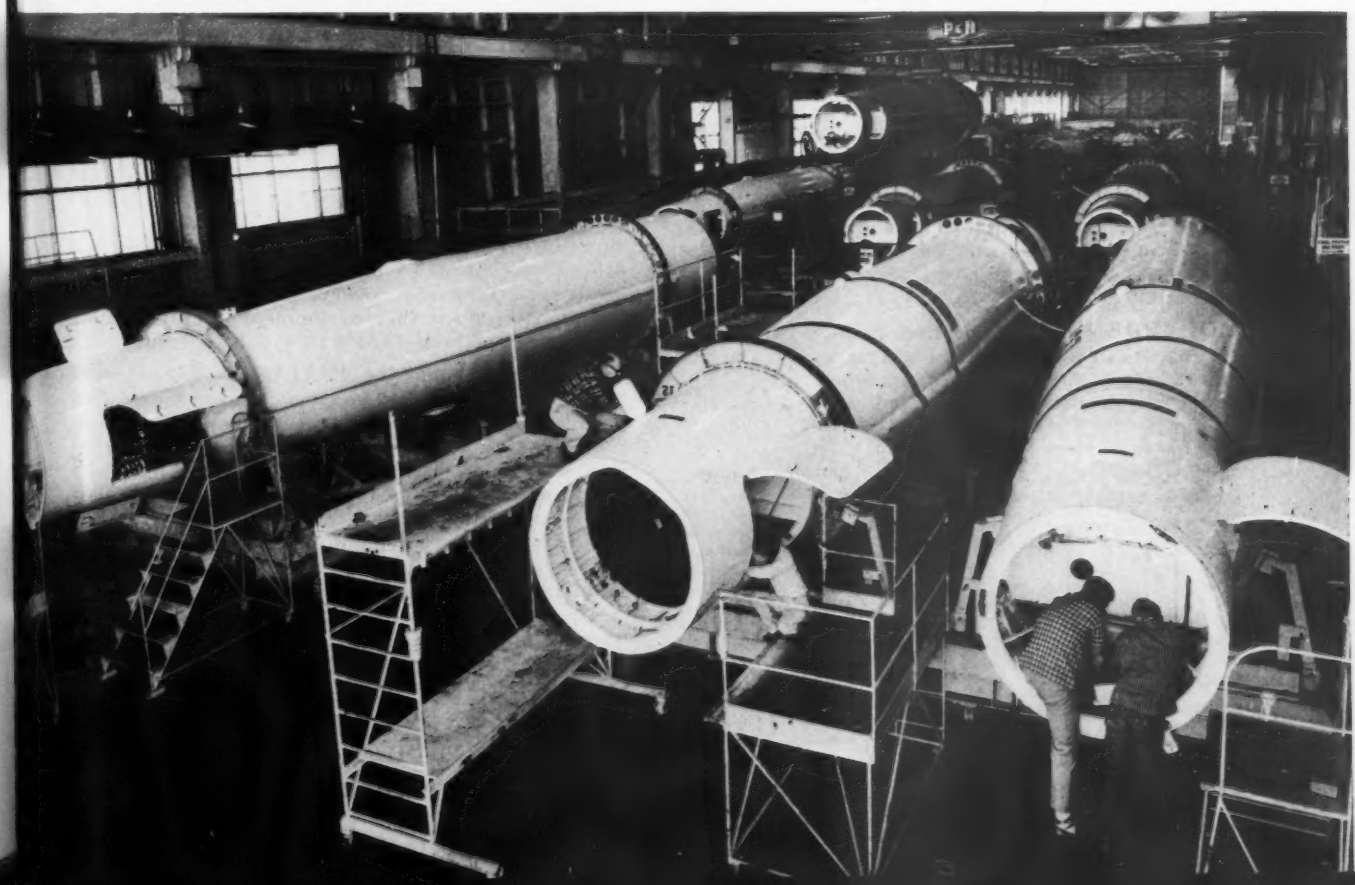
72 METAL SHOW PREVIEW

THIS IS THE SPACE AGE . . . where missiles and rockets—using new alloys and exotic metals—are produced in Western plants on an assembly line basis . . .

THIS IS THE SPACE AGE . . . where old operations require new techniques if Western plant operators want to keep up with the times . . .

AND THESE PAGES TELL HOW Western production men are saving time and money in their Space Age metalworking operations.

THOR PRODUCTION LINE (Douglas Aircraft) where metals for missiles are used on an assembly line basis.



METALLURGY

Here are some answers to the Space Age challenge . . .

THE SPACE AGE is making new demands of metallurgy on all fronts. And metallurgy is meeting this challenge by pushing back the frontiers on developments of both basic and the "exotic" metals. Significantly, much of this development is taking place in the West . . . where our missile and rocket industry is waiting for new metals and alloys to thrust further into the future.

Following are some of these metallurgical developments . . . as reported by leading Western metallurgists, educators, manufacturers, and Bureau of Mines officials:

STEEL — Big news is Kaiser Steel's new oxygen furnace (February WI) which makes steel in minutes instead of hours. While the most significant part of this process is to step up production of steel, it also means that new frontiers of steel making are being explored. Among these are high strength alloyed steels that are going into missile production. The "Atlas" required a precise strength-weight ratio that was achieved by using stainless steel. And more steel—in the form of honeycomb and thin gage—is going into all phases of our missile and rocket program . . . as tensile strength goes up and weight comes down.

ALUMINUM—New uses are being found for this versatile metal. From metal frames for windows . . . to transmission lines . . . to structural work . . . to automobiles . . . to missile production. And new alloys are being developed. Much progress in aluminum manufacture and fabrication is taking place in the West, as new facilities are being completed and more industries spring up out here that use aluminum as a basic material.

ZIRCONIUM—A process (the Kroll process) has been developed by the Federal Bureau of Mines at Albany, Ore., that can produce zirconium of such purity and ductility that it can be rolled into sheets. These sheets can be used in atomic reactors to protect uranium fuel. Reserves of zirconium in the U. S. are great and the cost of producing the metal is coming down.

MOLYBDENUM — The first hollow, cylindrical casting of molybdenum has been made. This metal has excellent strength at high temperatures. This strength is needed for certain applications in missile parts to withstand intense heat. And new methods are being sought to make this metal more workable. Molybdenum also is used in high-temperature alloys, plates in electronic tubes, lead and grid wires and varied other electrical devices, and in heat radiation shields.

OPTIMISM REIGNS—as Thomas Hazlett (left), associate professor of industrial engineering, and **Earl R. Parker,** professor of metallurgy, Univ. of Calif., discuss some of the metallurgy advances now underway. These gentlemen were among those interviewed for this article.

HAFNIUM—Pure hafnium has been produced by the Federal Bureau of Mines with a process less costly than currently in use. Hafnium's value lies in the fact that—although it resembles zirconium in many respects—it has the direct opposite nuclear property of shielding against the passage of neutrons. It is double the weight of zirconium, less than the weight of lead.

COLUMBIUM-TANTALUM SEPARATION — An inexpensive and effective way has been found to separate these metals. Columbium is used in the manufacture of stainless steels as a stabilizing agent. Its temperature-resistant characteristics make it valuable as an alloying agent in metals used in jet engines, gas turbines and missile engines. It also has certain nuclear energy applications. Tantalum is chemically resistant to most corrosive materials and is used in the manufacture of corrosion-proof containers.

MANGANESE — Production of high-quality synthetic manganese dioxide by chemical means is being investigated. Also, improvements are being sought in an oil-emulsion flotation process for manganese ores; and for other processes for ore recovery.

BERYLLIUM—The program has been stepped up to find domestic sources of beryl . . . and new mining and metallurgical studies are underway to supply fast-growing needs of the missile, aircraft, and atomic-energy fields. Most recovery practices currently employed include flotation, but because the mineral association of beryl is so varied, almost every deposit requires a different technique. A few types of beryl have responded to concentration, but others have yielded concentrates that are too low-grade for economic recovery. Thus, some beryl deposits may require the development of entirely new processing methods before they can be utilized.

COLUMBIUM and TANTALUM — Experiments are under way to improve extraction of columbium and tantalum from Idaho euxenite ore to production of super-pure metals. The solvent-extraction process for producing separated columbium and tantalum oxides already is being used commercially. Fractional distillation of the chlorides will be studied as an alternate, and possibly more economical, method. There are also other studies (electron-beam, etc.) to produce pure columbium and tantalum.

TITANIUM — The Federal Bureau of Mines at Boulder City, Nev., is concentrating on chlorination studies of titaniferous materials and electrochemical studies. Laboratory studies are continuing on the recently developed electro-refining method

for recovering high-purity titanium metal from scrap and other materials. New castings methods will be used, such as centrifugal and spin casting.
TUNGSTEN — Research on high-purity tungsten includes: preparation of metal from the highest purity commercial compounds available and further purification by zone refining; investigations of electrolysis using fused salts or other electrolytes; preparation of tungsten oxides and halides and bomb reduction and hydrogen reduction; preparation and chemical purification of tungsten-bearing solutions and compounds and subsequent reduction to metal.
CERIUM—High purity cerium metal, which may help develop "super alloys" is now being produced experimentally at the Federal Bureau of Mines laboratories in Reno. Almost totally free of iron, carbon, and hydrogen, the metal attracts and absorbs impurities that enter other metals when they are molten. Thus, it may be useful in producing other metals in purer form. These, in turn, would be blended to make new and stronger alloys that can withstand the high temperatures encountered in rocket and missile applications.
YTTRIUM—This metal has been successfully produced into a pliant, easily formed material that may be the answer to difficult problems in atomic-reactor and missile design. Bureau of Mines researchers foresee a potential value for yttrium in alloys, where its qualities could be blended with those of other metals to create new materials to meet increasingly rigorous specifications. Availability of this metal in ductile form may mean new applications.

A MAJOR BREAKTHROUGH in producing ingots of "Space Age" metals that are so pure they can be worked with standard metalworking equipment has been reported by The Stauffer-Temescal Co., Richmond, Calif.

With the electron bombardment melting technique, such metals as tungsten, tantalum, molybdenum, beryllium, columbium, and others, can be melted and cast in pure ingots.

This is possible because of a new furnace that combines high vacuum technique and electronic control.

Material—in the form of powder, sponge, sintered bar stock, or pre-melted ingot—is charged into the system through the entrance lock. When the material reaches the bombardment area of the upper gun it fuses and drips into the water cooled ingot mold.

The lower gun is concentric with the ingot mold and maintains a molten pool in the mold into which the feed stock drips. The ingot mold is shallow and open on the bottom. As the material solidifies it is extracted from the mold by the ingot puller at a rate selected to maintain a constant level in the pool.

After a sufficient length of ingot is cast (generally around four ft.) it is dropped through a valve into the ingot removal lock. Here it is allowed to cool prior to removal while another ingot is started in the melting chamber.

Significant portions of the process are the initial melting and dropping of the feed stock, and the time the material remains in the molten pool in the ingot mold. The combination of low pressure, high temperature and lack of contaminating materials in contact with the melt provides necessary environment for the purification and devolatilization reactions for successful melting.

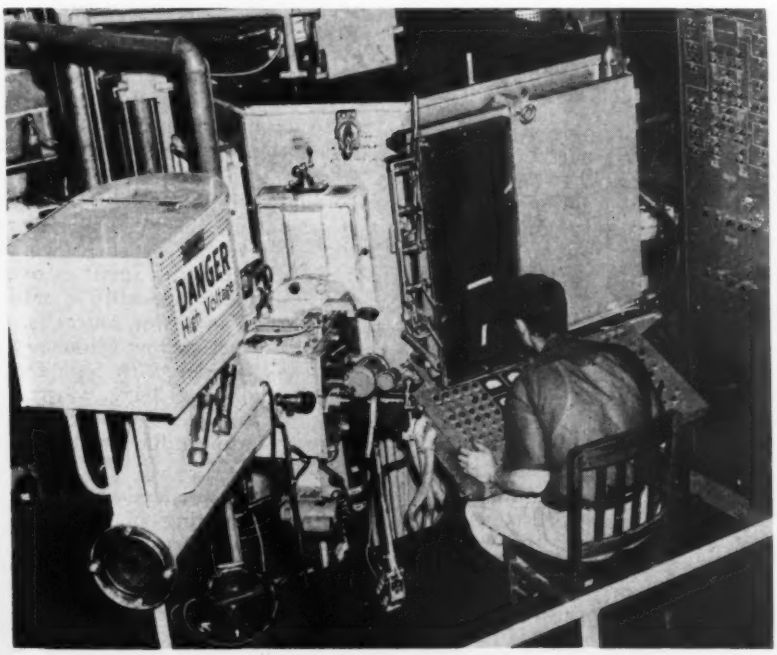
As the feed material is first melted, violent outgassing and splattering are usually encountered. So the furnace must be capable of steady operation in face of these conditions.

This is solved by: (1) a high vacuum pumping system of sufficient capacity to maintain an operating pressure in the chamber of 10-4 mm of Hg at high melting rates, and (2) a high voltage power supply which includes a constant current injut and an emission controller on the cathode. This permits precise control of the melting rate of any metal. In the case of very pure columbium, over 200 lb. can be melted in an hour, but the average melting rate for commercial columbium ranges from 10 to 50 lb. per hour.

By adjusting the electron bombardment, mass production welding can be accomplished.

Dr. Donald F. Mastick, general manager of Stauffer-Temescal Co., says "Electron bombardment melting has emerged from the laboratory and has become a practical production technique. And while this method has particular advantages on the refractory and reactive metals, its use can be applied to a wide variety of metals and alloys. We have found that the electron bombardment-high vacuum technique has purified metals to a greater extent than is presently possible in vacuum arc or conventional induction melting."

FURNACE USED to produce pure ingots of exotic metals.



WELDING

New techniques developed for the Space Age . . . welding seams on round shapes . . . large rectangular vessels . . . improving appearance of welds . . .

FOR MISSILES—This device welds light gage stainless steel.

Conquering Space Age welding . . .

WELDING AND FORMING light gage metals were among the major problems in setting up production line methods for the Atlas intercontinental ballistic missile.

Production men and engineers at Convair (Astronautics) Division of General Dynamics Corp. designed and adapted welding fixtures to handle aluminum, titanium, high-nickel alloys and many austenitic stainless steels in thicknesses ranging from 0.001 to 0.1-in.

One recently developed tool, currently used for experimental purposes only, has been used successfully in butt welding stainless steel and titanium from 0.001 to 0.010 in. The arc is variable from 1/10 amp. to 10 amp.

Another welding fixture was developed for a part Convair-Astronautics wanted to subcontract. This involved welding contoured pieces of .016-in. aluminum alloy into a non-structural component. The metal industry was canvassed, but not a single firm could be found that wanted to undertake the job of welding aluminum of that gage.

Finally, the Astronautics Tooling Department designed and constructed a fixture for handling the work and then a subcontractor was found who would do the work with the Convair-furnished tool. This device for welding light gage aluminum is an automatic metal arc, inert gas, nonconsumable electrode process with filler metal added, and using voltage control automatic head.

The emphasis has been on reliability in designing the welding tools. And tight inspection procedures have been set up to help guarantee extremely high quality welding. Recent tests have shown an average of one repair necessary for each 100,000 spot welds.

This level of efficiency is worth the painstaking effort when one remembers that a rupture at a critical time could set back the nation's ICBM program by weeks and, under some circumstances, could lead to destruction of millions of dollars worth of equipment.

Using cold worked stainless steels rated at from 150,000 psi. to 200,000 psi. minimum yield, weld joint efficiency of 100% of minimum values and 97% of actual values of the material has been achieved through a combination of metal arc welding with resistance welded reinforcements.

The various welding fixtures use constant welding speeds varying from about 15 in. per minute to about 40 in. per minute, depending upon the thickness of the metal being welded. For material up to 0.008 in., a speed rate of 40 in. a minute is used. Metals between 0.075 and 0.100 in. require a 15-in.-per-minute welding speed.

One machine designed for either light-gage tubing or sheet work can handle tubes as small as one inch in diameter and 0.010-in. wall thickness. The power source is a 200-amp. direct current Miller rectifier type welder with high frequency and time-delay controls for water and gas. An arc of as low as ½ amp. can be started and maintained.

The weld is shielded with a gas mixture consisting of six parts helium and one part argon. The side-beam carriage with electronic governor provides a smooth and even rate of travel for the torch over a maximum length of six

feet. The carriage was built by Linde Air Products Co.

Like most of the other welding tools, this has a rigid fixture frame supporting multiple clamps with minimum deflection. The construction is designed to maintain equalized clamping pressure for the full length of the backup bar. Pneumatic clamping is applied by fire hoses. The 73 clamps on each side are one inch in width, and are made of stainless steel to eliminate magnetic arc blow and pickup of contaminating elements.

Electrical heating elements are used to provide uniform preheat and postheat on the heavier gages of some alloys. Cooling water is used during welding of gages smaller than 0.064 in. A duct large enough to assure even distribution of backup gas extends the full length of the bar.

An arc and gas shield which travels with the torch was developed to provide better gas coverage on the top side of the weld, and, hence, a cleaner weld. In addition, it eliminates the necessity for the welder's headgear and serves to protect other persons in the area. It is made of material similar to that used in welders' helmets.

Most of these special welding fixtures are set to weld a given thickness of metal and are used for that gage only. Very few repairs have been required on the fixtures and the quality of work done on them has been remarkable.

In another field, Astronautics has been experimenting recently with stretch forming gored sections of cold worked stainless steels at sub-zero temperatures to increase their tensile strength. Best results so far have been obtained by use of a special die containing circulating pipes.

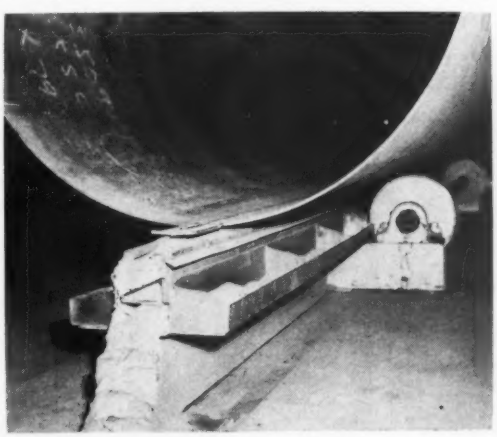
Alcohol chilled by dry ice to about -100 F. deg. is circulated through the pipes until the die is well cooled. The part to be formed is submerged in alcohol at the same temperature, then put into the former and pulled. The stretching is done at a slower rate than it would be if the metal were at room temperature.

Welding seams on round objects...

A FASTER, SIMPLIFIED METHOD of welding seams on pipe sections or other cylindrically shaped items, employing a flux back-up technique, has been developed and placed in operation at Kaiser Steel's Fontana, Calif., Fabricating Division plant.

The chief advantage of the flux back-up method over conventional welding techniques is it eliminates the initial hand welded sealer bead which must be applied for purposes of holding the cylinders intact during completion of the machine welding. The new method also eliminates the need to remove the bead by scarfing or chipping and makes the fit-up process easier. Plant engineers report the new technique is 50% faster than conventional welding methods.

In welding girth seams by the flux back-up method, the two cylinders to be joined are tacked just enough to insure alignment. The sections rest on a set of trunions which allow them to be rotated. The flux is fed underneath the pipe by a deep groove in the belting arrangement which is driven by frictional contact with the pipe. The machine welding process is then completed inside and out.



IN LONGITUDINAL WELDS the cylinder is positioned over the flux back-up trough. Compressed air is injected into the pneumatic hose (foreground) which forces the trough with its flux upward against the cylinder. This provides the flux back-up beneath the seam as it is welded.

Flux back-up is also used in welding longitudinal pipe seams. Compressed air is injected into a pneumatic hose which, when inflated, applies pressure to the flux trough to force the flux firmly against the plate to be welded. The flux trough runs the entire length of the pipe or vessel adjacent to the arc path.

The air pressure in the tube is controlled which, in turn, permits the pressure of the flux against the steel plate to be set at any predetermined level for the desired penetration. The method permits both edges of the plate to be prepared simultaneously, thus eliminating the back chipping process.

The new method has been used successfully to weld steel plate up to 3½ in. thick. Throughout the plant numerous short portable flux boxes are used with the same flux pressure method applied. The method consistently produces X-ray quality welds.

The flux back-up method was developed by Fontana's welding superintendent, **R. S. Jeffrey.**

Cutting costs on rectangular units

A COST CUTTING, time saving method for welding large rectangular tanks and vessels has been developed by Puget Sound Fabricators, Inc. of Seattle.

The firm — in custom fabricating 34 steel, lithcote-lined fermenting tanks (weighing 13 tons each and measuring 11 ft. high, 13½ ft. wide and 35 ft., 3 in. long) —faced a complicated problem not only in welding, but in handling.

In order to insure the highest degree of structural integrity in the vessels, which were being fabricated for the new fermenting cellar under construction at Sick's Rainier Brewery in Seattle, all welds were made in the downhand position with welders working always from the top side of the tank.

To solve the problem of frequently lifting and turning the tanks during welding operations, Puget Sound Fabricators designed two circular steel grooved rings

CHECKING WELDING RINGS in action are **George Dexter** (left), Puget Sound executive V.P., and **George Taylor,** V.P. of production.

fitting around the tanks at the front and rear and rolling through two sets of wheels mounted on the floor.

The use of the rings eliminated complicated maneuvering of cranes and the possibility of overloading equipment and damaging the tanks in picking them up, turning them, and then lowering them again.

As the welding on the top side of each tank was completed, it was quickly and effortlessly rotated with the aid of a crane, so that the next side would fall in the downhand position for welding. Through the use of the special rings, the firm was able to achieve the finest standards of workmanship and yet maintain a high rate of production efficiency.

Improving appearance, strength...

IF A GOOD WELD is as ugly as a sore thumb, it's not going to help sell a product.

But if it's as good looking as it's strong . . . it can certainly add to sales appeal.

Two California firms — both producing and working on mobile equipment—have solved the problem of producing good welds with sales appeal. By doing so, they have increased welding output by as much as three times.

The Peterson Tractor & Equipment Co. in San Leandro repairs, converts, and manufactures heavy earthmoving equipment. Welding is noticeable on many parts.

To obtain welds of maximum strength and better appearance, Peterson went to squirt welding, which combines the advantages of automatic submerged arc with the versatility of manual welding. Not only that, but it went to an entirely new concept in this field —"mechanized squirt welding."

With this welding equipment it is possible, for example, to weld at 450 amps. at 50 in. per min. of ¼-in. butt welds. And the welding speed can be increased by a speed control drive wheel, notched for maximum traction. With this wheel — that is capable of going backwards and forward — speeds up to 70 in. per min. can be obtained.

Another time saver is in the use of flux. Formerly, the operator had to stop every so often and fill a flux pot. But with the 100 lb. capacity flux tank, many more hours of welding can be accomplished before refilling the pot.

Also, "hot starts" are possible. When the operator pushes the trigger on the welding gun, the electrode feeds to the work "hot" for instantaneous and positive start.

Another advantage is the versatility of the equipment.

Sam Hylton, Peterson foreman, says: "We use this method on structural members from 30 ft. long to six-in. short. The equipment is completely portable so we can take it to any part of our plant. And when we need to position a member for mechanized squirt welding we can do so by placing it in our Harnischfeger welding positioner."

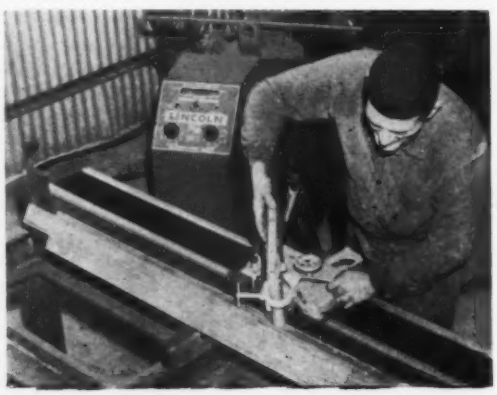
Sam and his operators also like the deeper penetration of mechanized squirt welding (up to 750 amps. can be used), the precise arc control, and the cleanliness of the operation.

Another advocate of mechanized squirt welding is **Leonard Low** of York Lift Truck Manufacturers, Inc. This firm, which builds towable lift trucks, uses mechanized squirt welding wherever possible. Formerly it used manual submerged arc welding.

But since converting to mechanized squirt welding, the firm is able to weld over three times faster! And with the use of an automatic welding guide (Guide-Weld), speeds up to 30 in. a min. are possible.

Mr. Low heads a small work force (five men) in a highly competitive market. Time is of the essence. And quality as well as strength is essential in welding. Mr. Low remarks: "We're looking for new uses for our mechanized squirt welding outfit. Not only does it speed up our process, but the smooth, ripple-free welds enhance the prestige of our products."

The mechanized squirt welding units used at Peterson Tractor and York Lift Truck are the Lincoln Electric Co. ML-3's, a new unit which was just introduced about a year ago.



THE LINCOLN ELECTRIC CO. mechanized squirt welder improves appearance, strength, and steps up welding production at York Lift Truck Manufacturers, Inc.

BRAZING

Use of lithium alloy cuts honeycomb rejects . . . Space Age makes new demands on brazing for missiles, rockets, etc . . . . . .

COMPOSITION BY PERCENT

Alloy Type	Ag	Au	Pd	Cr	Mn	Cu	Ni	Li	Si	B	MELT(F°)	FLOW(F°)
Silver-Copper-Lithium	92.3					7.5		0.2			1435	1635
Silver-Palladium	90.0		10.0								1835	1950
Manganese-Nickel					70.0		30.0				1840	1875
Nickel-Chromium-Silicon-Boron	(Balance Fe)			16.0			72.5		5.0	3.5	1825	1840
Gold-Chromium-Nickel		72.0		6.0			22.0				1785	1835

TABLE I: Some of the newer filler metals for brazing heat-resistant alloys.

Honeycomb rejects lowered . . .

USE OF A LITHIUM ALLOY called Lithobraze 925 in place of silver-manganese has reduced the reject rate on brazed honeycomb sections from 45-50% down to less than 10%.

The contribution lithium makes in filler metals for brazing heat resistant alloys was outlined recently by **A. M. Setapen,** manager of engineering, Handy and Harman, a firm specializing in precious metal brazing . . . a process of vital importance in the West's fast expanding aircraft manufacturing industry.

Addition of a small percentage of lithium markedly improves the fluidity and wetting ability of many standard alloys, and it is now possible to braze stainless steel in an atmosphere, without flux, at temperatures as low as 1600 F.

The lithium alloy contains 0.2% lithium and has been found to be of particular value in brazing honeycomb panels made of 17-7 PH stainless steel. Its flow temperature corresponds to the temperature for proper heat treatment of this metal, and the joints retain a tensile strength of about 35,000 - 40,000 psi. at 900 deg. F. (short-time test), which is the maximum service temperature for 17-7. The filler also readily wets in vacuum, dry hydrogen, or inert gases, without flux. Because of its high fluidity, this silver-copper-lithium filler is able to penetrate small gaps between the components of the brazed sandwich, and it represents a marked improvement over silver-manganese which does not wet easily on 17-7 PH steel.

It is the corrosion resistant quality of Lithobraze 925 alloy which is responsible for the reduced reject rates from 50% down to less than 10%.

However, high fluidity of the alloy has inherent problems, one of which is that when used on large, curved surfaces, there tends to be excessive run-off.

Tests are presently underway to overcome this problem, which, if successful, will improve the process of brazing honeycomb, while reducing the costs to such a degree that brazed honeycomb will become a standard high-strength, light-weight structural material in the construction of aircraft.

The use of gold alloys is also gathering momentum in situations where intergranular penetration of the base metal cannot be tolerated, and where high strength and excellent oxidation resistance are required at temperatures around 1600 F.

High gold content makes these alloys expensive on a per-ounce basis, but in cases where the value of the assembly is great and high temperature performance must be reliable, it pays to invest in the small amount of alloy needed to make the joint.

Compared with high-nickel alloys, the gold alloys have lower degrees of hardness, better ductility and less tendency toward intergranular penetration.

And they can be produced in a variety of wrought forms, sheet, wire strip, etc., in contrast to nickel-boron-silicon alloys which are available only in powder, sintered powder, or cast forms. In addition, gold alloys have excellent wetting and flow characteristics.

Look at the following examples and you will understand the reason for the constantly increasing use of gold-nickel-chromium fillers:

Lap joints between Inconel and stainless steel, brazed in helium atmosphere at 1900 F. without flux, were exposed to air at 1600 F. for a period of 88 hr. with no adverse effect. Photomicrographs

of other joints in Inconel and stainless steel assemblies show only slight grain boundary attack on the stainless steel, but the extent was negligible considering the long brazing cycle employed. Nor was there any intergranular penetration in the Inconel part of the assembly.

Other joints, brazed in stainless steel with the gold-chromium-nickel filler and heated in air for 7 days at 1600 F., retained a tensile strength of 20,000 psi. when tested at 1600 F . . . an excellent performance considering the temperature, and of vital importance in the expanding rocket motor, missile and supersonic aircraft industry in the West.

Special brazing for missiles...

IGNORANCE IS FAR FROM BLISS when it costs money — and that's precisely the penalty paid by designers unaware of the various brazing methods available.

You know better? . . . all right, solve this problem:

Lear Inc., Santa Monica, Calif., wanted a magnetic brake disc and shaft assembly for use in an application where critical tolerance is vital. Assembly was to consist of mounting a ⅛-in. diameter torque shaft to a 2¼-in. diameter perforated and formed sheet of plain carbon steel.

Sound simple? . . . well, it isn't.

Most standard methods of joining the heavy shaft to the thin perforated disc would result in distortion and—remember—precise alignment is mandatory. Thermal stress gradient sets up distortion where the heavy shaft cools slower than the light perforated disc, providing a greater shear area to absorb torque loading. And because of the high speeds involved in using the magnetic brake disc, concentricity of the shaft with the flange of the perforated disc is critical.

Superweld Corp., North Hollywood, Calif., a firm which has specialized in experimentation in brazing as related to the missile field, solved the magnetic brake disc problem for Lear Inc., by use of a thermal process in which ferrous metal parts are joined under high temperature in an electric surface. Union of the two metals is accomplished by atomic bonding through the intermediation of a fused filler metal whose melting point is lower than the base metal —in this case, steel.

The process is allied to both welding and brazing, differs in that there is no distortion or deformation and through the use of much higher temperatures.

Key to the Superweld method is an automatic-charging roller-hearth conveyor-type furnace, 103 ft. in length, which employs a controlled atmosphere to promote the flow of filler metal and prevent oxidation of the parts being processed. The furnace atmosphere is made by exothermic burning of natural gas and compressed air over a nickel-impregnated catalyst brick. The products of combustion are thoroughly dried and then introduced into the furnace.

The magnetic brake disc and shaft proved an ideal application for this brazing method as the interface between parts of the assembly could be completely filled. In addition, cost savings resulted because the disc and shaft could be joined while the latter was in blank, unformed stage . . . and because the screen is annealed, subsequent forming can be done without encountering any appreciable amount of spring-back.

But most important — parts in the furnace are heated and cooled uniformly, avoiding thermal stress created by other joining methods.

Here's the step-by-step way in which the magnetic brake disc and shaft were assembled:

1. Brake disc, shaft and ½-in. washer received from Lear Inc.

2. Inspected to make sure shafts are not dented.

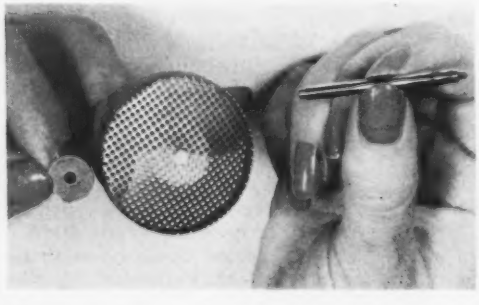
3. Parts tri-chlorethylene vapor degreased in a 35-ft. conveyorized automatic spray unit.

4. Parts assembled and resistance tack welded. A preformed copper brazing ring is placed on the shaft adjacent to the joint.

5. Parts are placed on an inconel brazing screen and automatically loaded into a preheat chamber on a 103-ft. conveyor. Controlled atmosphere in the furnace is at 2,050 deg. F.

6. Parts emerge 35 minutes later at room temperature completely brazed and are ready for return to the customer the same day (as the furnace operates on a 24-hr. schedule, parts can be run experimentally.)

It is because the Superwelding process allows fabrication of complex units from simple parts, that it is ideal for making prototype models at low cost. And because there is theoretically no limit to the number of joints in an assembly which may be joined in one trip through the furnace—the greater the number the lower the cost per joint.



MANUAL ASSEMBLY of torque shaft, reinforcing washer and magnetic disk, after degreasing. At the time of writing, a further improvement had been adopted in that the screen — ultimately a crown shape—is blanked but not formed until AFTER brazing. This allows annealing of the perforated sheet during brazing—and the post-forming operation assures accurate alignment.

DRY HYDROGEN and VACUUM BRAZING for missile and rockets is being studied and developed by **Harry E. Lewis** (left), Pyromet Co., South San Francisco, and **Robert C. Bertossa**, formerly of Stanford Research Institute, now technical director of Pyromet. All types of exotic metals are undergoing brazing treatment, using these two methods.

CASTINGS

Permanent mold method developes pearlite . . . rigid controls applied to foundry sand . . . quality control pays off in castings . . ."two for one" pour . . .

Pearlite in a permanent mold . . .

WHO SAID there's nothing new in casting?

Take a look at what the Dayton Foundry in Hollydale, Calif., came up with. Although it took months of experiments, the result was development of a basic iron mix which, when poured under closely controlled melting conditions, makes it possible to develop pearlite in a permanent mold.

Metallurgists have long agreed that pearlite is the best obtainable structure in grey iron for the combination of machinability, wear and strength, but it wasn't until recently that it became practical to achieve pearlite in grey iron cast in a non-refractory coated mold.

Refractory coatings, the method previously used to obtain pearlite structures, had the disadvantages of being of slow process. And heat treatment to make castings which could be machined at high speeds produced materials with a structure consisting primarily of ferrite and graphite, with a relatively soft metalographic characteristic.

The experiment that took place at Dayton Foundry resulted in a basic mix charged into the furnace of 90% foundry pig iron, and 10% carbon steel scrap.

This was melted in a 1500-lb. Ajax low frequency induction furnace and poured at 2550 deg. F.-2600 deg. F.

Chemical composition of the mix was:

3.6% total carbon
2.6 % silicone
.5% chrome
.5% moly.

The difference the permanent mold process makes in the pearlite structure is graphically illustrated in the photographs. Fig. 1 shows the predominance of white area (ferrite) and black graphite. Both pictures are cross sections of a liner centrifugally cast and blown up to 500 magnifications, but note that in Fig. 2, after change in chemical composition, there is much less white area visible (i.e. less ferrite).

By close examination of the second photograph you will be able to see that the amount of free carbon hasn't changed, but that white ferrite has been replaced by distinct grey areas of pearlite. And this is precisely what Dayton Foundry was trying to discover in experiments — how to reduce the poor wear resistance, soft micro-structure of ferrite and replace it by pearlite.

In case anybody is still wondering, free carbon is desirable in grey iron since it adds self-contained lubrication, giving it an edge over steel.

What does the development of pearlite liners made by permanent mold methods add up to? — Just this—it means liners now have far greater wear resistance, and that's important when they're used with abrasive materials such as clay pipe, which wear out standard liners very quickly. And that means savings, which ever way you look at it.

FIGURE 1—cross section of centrifugally cast grey iron liner prior to late addition inoculation. Note predominance of white area. This is ferrite, poor in wear resistance and soft in micro-structure. Black area is free carbon, which adds self-contained lubrication property to grey iron.

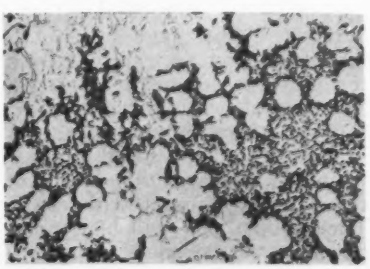


FIGURE 2—similar cross section of grey iron liner after late addition process has changed chemical composition of pearlite structure. Note reduced white (ferrite) areas have been replaced by grey pearlite structure closer to black areas of free carbon.

Applying controls to foundry sand

SAND TO THE FOUNDRY is like water to the fisherman. The sand's consistency and condition at the point of molding must be rigidly controlled to assure uniform manufacturing results.

Here is how one firm—Pacific Steel Casting Co. of Berkeley, Calif.—has solved sand quality control:

Receiving the washed, dried and screened sand from points all over the world in special boxcars, Pacific Steel dumps it into below the ground hoppers where, carefully free from moisture and contamination, the sand is fed pneumatically into silo storage and then to internal storage high atop large mixers.

From this storage through

weighing hoppers the sand is fed into one of three mixers where it is blended through the addition of cereal binders, bentonite (special clay), wood flour, fire clay, resins and oils. The type and quantity of each additive is determined by the type of molding task each final batch must perform.

Water is then metered carefully into each mix and the whole product mulled from one to fifteen minutes, depending on the use. Sands suitable for molding and coremaking needs are now ready, and this is the point at which test control is introduced.

While the new sand has already been tested for uniformity of grain size by the placing of a weighed sample on a multiple screen shaker, several other tests must be regularly made to assure uniformity of each batch. In order, the tests performed are as follows:

1. A sample of prepared sand is weighed, placed in a hot air drier, then weighed again to check for proper moisture content.

2. A second sample is placed in a rammer and rammed to a hardness similar to actual molding.

3. This rammed specimen is placed over a mercury bath where the speed with which ordinary air passes through the bonded grains indicates permeability—how fast mold gases can escape without metal penetration.

4. Then sand is given a green strength test. The sample is placed on a weighted pendulum which is slowly hand cranked upward. When the specimen crumbles a magnetic indicator shows on a scale how much green strength the sand will give. (Coremaking sands are usually cured by baking while ordinary molding sands are not, hence samples not already baked are called "green").

These tests are run regularly throughout the day and the reports carefully analyzed — thus any trouble with Pacific Steel's molding sands, its main manufacturing staple, can be caught and rectified before damage occurs to product quality, and the company's adherence to the highest standards of quality can be maintained.

TESTING—This shows some of the intricate testing of foundry sand at Pacific Steel Casting Co. Here, operator puts sand through a permeability tester and a "green" strength tester.

Quality control pays big dividends

A BIG INVESTMENT in quality control is paying off at the Oakland foundry of General Metals Corp.

General Metals has found that by carefully inspecting a sample casting for possible flaws (cracks, internal shrinkage, etc.), design or procedural errors can be detected before making production runs.

If something is wrong with the sample, the flaw is carefully analyzed. The need for changes in molding techniques, or pouring temperatures, may be indicated.

This super detection work is possible because of two outstanding testing apparatus at General Metals: (1) a Magnaglo tester for external flaws and (2) a 1,000,000-volt X-ray machine to test for internal shrinkage.

The Magnaglo tester is used on some parts at two stages of production: (1) before heat treating; (2) after heat treating; and on aircraft inspection.

With the Magnaglo unit, one man can inspect a part in 15 or 20 seconds. With the old system (Magnaflux with prods) it took two men at least one minute. And with Magnaglo, testing is much more accurate.

In Magnaglo testing 1000 to 3000 amps. are introduced into the part, setting up a magnetic field. Then small metal oxide particles are sprayed over the surface. If the magnetic field is interrupted by an external flaw, the particles adhere to this spot. An ultra violet light helps detect those particles clinging to a flaw.

When this happens, the operator notes the exact dimensions of the flaw, marking it with chalk. The casting flaw will be ground down for further close inspection and to determine the depth of the crack. Grinding may remove the flaw, or welding may be necessary if it is deep.

Particular patterns of metal particles caused by flaws indicate to the trained what type of flaw is present and the remedial action necessary.

The same applies to flaws detected with the 1,000,000-v. X-ray machine. One of the few in the West, this machine determines the most minute inner shrinkage of any casting. The very inner core of the casting is revealed under this machine.

Magnaglo and X-ray testing—combined with vigilance all along the way—is paying off for General Metals. The big investment in testing equipment is worth it—because of savings inherent in non-destructive testing and assessed quality control. Chief metallurgist at the Oakland foundry of General Metals says, "By using quality control as a production tool we have not only saved time, and money, but we can guarantee that our castings will meet the most exacting specifications. That's what all production men aim for . . . and our aim is now scoring bull's eyes all the time."

Two-for-one pour

Superior Electrocast Foundry Co., San Francisco, uses an insert plate with four pins so two dissimilar molds or patterns can be cast at the same time. With four pins in the plate, all you have to do is make sure the two dissimilar patterns fit into the holes—then you can make your pour for both at the same time.

MACHINING

New use of machines, manpower to meet the Space Age... short cuts to precision machining ... upping quality, quantity of aircraft parts . . .

Machining for the Space Age...

MACHINING FOR THE SPACE AGE has made many Western machine shops do a lot of reorganizing in both men and machines. One such shop is Allied Engineering & Production Corp., Alameda, Calif., which has had to solve many problems in meeting this Space Age challenge.

Some of the problems involved with working in a new and exotic atmosphere are attacked before they have a chance to develop; others are worked out in the production process.

To begin with, Allied has been as much an engineering organization as a metalworking shop during its nine years of existence. Assignments are accepted to design, develop and manufacture an item—often up to the prototype stage—but not to mass-manufacture. Work covers the broad fields of mechanisms and hydraulics, overlaps into other engineering areas, but steers clear of such highly specialized fields as intricate electronics. However, some of the equipment incorporates electronic motor controls and interlock safety devices.

A typical product currently in the works at Allied's shop is a test stand for rocket engines. It required about 350 hours of engineering before production ever began. Then actual production takes some 2,000 man-hours.

Liaison between the shop and the engineering department is a very important factor. A project often involves as many as 5,000 different parts, using many different materials, processes and skills.

When a job gets under way, usually the only thing to work with is a basic requirement drawing indicating in general what the customer thinks a product should look like and how it should function. It then becomes the task of the engineers to work up detailed drawings, submit them for approval and plan the actual production. A more complex assignment would be hard to imagine.

The Allied facilities are roughly divisible into three areas. The first is engineering, which occupies part of an upper floor. Right here is where Allied departs from the run-of-the-mill metal working shop. In so far as is possible, **every man is entrusted with the responsibility for following through entirely with his own phase of a job.** Thus, engineers, are expected to do most of their own drafting to insure that they remain in touch with their assignments.

The same policy of responsibility extends to the firm's second major division—the machine shop, which occupies about half of the company's 26,000 square feet of work space. The men who work here are selected for their versatility. Allied's theory is, "Keep a man excited about a project and he'll do a better job." **So machine operators, just like engineers, follow through on an assignment from beginning to end.**

In this shop, you can't tell a lathe operator from a grinder; every man in the shop can operate every piece of equipment, and does. Not only do they move from one machine to another, but from machine to bench and from bench to assembly.

Since work is on a custom rather than a production basis, the usual production flow is not followed. Instead, machine tools are grouped according to types. There is no material handling problem here because of the nature of the work. Major sub-departments radiate out from the center of the machine shop.

Of utmost importance is the method by which production is routed through the shop with the minimum of paperwork. Allied has tried several systems and finally settled on one of its own devising.

A work order is made up in quadruplicate, with the first and last copies going into the customer's file. One copy is attached to the prints for the shop superintendent, and the other goes to receiving for checking off against the delivery tickets as materials come in.

Job numbers are the same as purchase order numbers, but a different work order number is used in the shop.

Work order forms show what job a print is for, and include description, size, amount, vendors, dates ordered and due.

Incoming materials are marked with item numbers and placed on flats or in bins bearing the corresponding job number. In a large job which incorporates a great many items a letter is used in connection with a number series. Thus, a parts bin for that job may be tagged A101-200, while the next bin will be tagged A201-300.

A running total of all the hours on a job is kept and posted each morning. The superintendent can glance at the totals and tell how close to bid time he is running on any job. In fact, he knows the status of all particulars of a project. At the end of a job it then is a simple matter to cost out all the totals.

Management has its own particular approach to production problems. General policy is to review each procedure to see if there is an easier way to achieve an end. One recent example involved

a situation calling for splitting ¾-in. wall stainless steel tubing into segments. Normally this would mean tying up a boring mill for four to five days. A little on-the-job "brainstorming" resulted in turning out the same result in one day with a good friction saw.

The acquisition of new equipment is justified when it saves enough money. In a recent instance, a turning job was to have been farmed out, but bids ran three times higher than the bid price. So Allied bought a lathe and accomplished the job well within the bid price.

In the third of the company's divisions, the welding and fabrication shop works with automatic welding equipment to join all metals. A P&H heliarc welding machine with foot controls uses argon to shroud the puddle with an inert gas which prevents oxygen from contaminating the weld.

The metals that Allied works with include most of the metals and alloys known to exist except perhaps for those few that have only been produced in laboratories at high cost.

Each of these metals has its own traits as far as metal working is concerned; when two or more metals are joined together in the same component the problems are multiplied. One metal in particular is treated with great respect in this shop: stainless steel in the form of tubes and long shafts. It releases internal stresses during machining; the heat is not uniformly dissipated throughout the length of the piece.

Great care is likewise exercised in welding stainless steel; welding procedure is employed which tends to eliminate the localization of heat. Certain items are preheated. Caution is the rule in the selection of welding rod and equipment and in proper settings.

A mist spray has been found to be the best all-purpose coolant for the multiple uses in this shop. The oil-less type used won't rust work and distortion is minimized. Shop practice is to keep both work and tools cool.

Most of the cutting tools employed on Space Age work are sintered carbide tools. They prove impractical only when the optimum surface feet per minute rate is exceeded. However, in working aluminum it is possible to far exceed the usual rate of 400-1200 surface ft. per min. Cutting tool life is prolonged by altering clearances when working different metals.

Inspection takes place at many points along the routing of an item through the shop, but most commonly right on the machines, using standard equipment and tools. Because errors are nearly always caught before they can be translated into terms of scrap, rejects are almost non-existent in the shop.

The shop foreman has a follow-up system to avert errors due to carelessness. Supervising projects as they move through the plant, he confers with machinists before operations begin. Mistakes due to misunderstanding are minimized by holding briefing sessions in which machinists are not only told what and what not to do, but **why,** so they do not resent being instructed. Regular production sessions are held at which completion dates are set for new projects. Notes taken at the meetings are Verifaxed and copies are distributed to department heads so the responsibility is shared.

What are the principal challenges involved in working with Space Age production? Allied's shop brass believe the big difference lies in new materials and closer tolerances. While this shop works in ten thousandths, finer work involves millionths of an inch, and the machine shop must be ready to handle this kind of work. Allied is getting into finishes that are I. D. and O. D. honed — closer than No. 4 finishes. A necessary piece of new equipment to measure finishes is a profilometer.

Closely tied in with the machine shop is a relatively new department—its plastics plant, located on the same premises. Production here involves such items as missile valves and seals. Molds for these are made in the machine shop. The plant works only with exotic plastics—those too expensive for most commercial use.

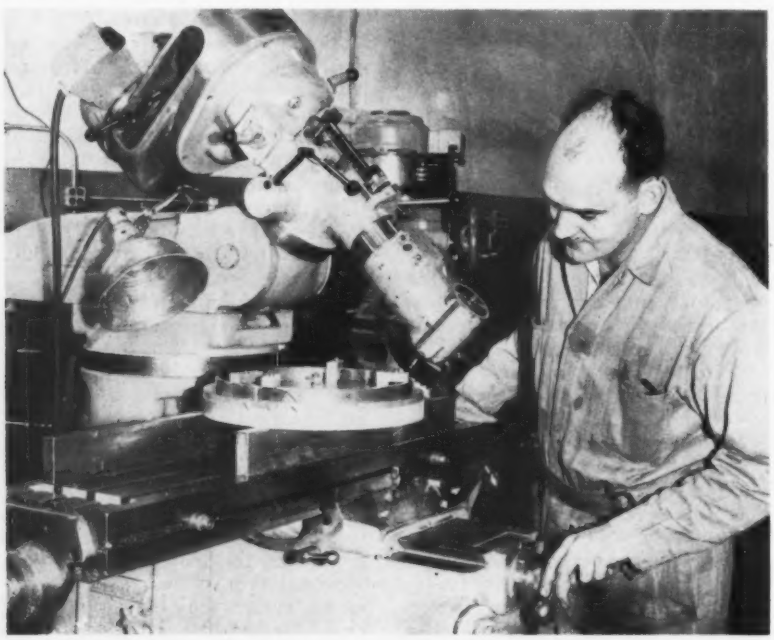
The necessity for machining some plastic items also points up the interdependency of the plastic shop and the metal working shop. Specialized ovens and presses turn out plastic in many forms by extrusion and molding.

The plant also operates its own on-premises foundry, with two gas-fired lead melting furnaces and one for aluminum. They are fitted with hydraulic tilting controls and a hydraulic power unit.

Many techniques are so new that the shop is still feeling its way, learning by experimenting. For example, experience has shown that bonding metal to plastic can best be done by sandblasting or liquid honing the metal to give it a fine tooth for the cement to hold. If the surfaces are wet, the liquid cement is administered with a dropper and capillary action helps to spread it.

Another lesson learned was to

ON A MILLING MACHINE with right angle auxiliary head, operator mills an intricate angular slot in a copper ring held in an aluminum fixture.



have all steel stock sent directly to the grinders for surface grinding. This provides a smooth surface for layout, for reference points, and often eliminates several machining operations and turning a part around unnecessarily.

Sometimes very large parts are made in sections, using locating pins and shoulders in joining them—all of which results in easier handling.

Efficient methods to precision work

PRECISION MACHINING several thousand parts could be a production headache.

But at Marchant Calculators Div. of Smith-Corona Marchant Inc. several innovations have been introduced to smooth production and assure highest quality.

One innovation is the Short Run department. Faced with the need to bring an ever increasing line of new products to the market with short lead times, Marchant has instituted a short-run department that specializes in the production of limited quantities of parts over low cost tooling. Extensive use is made of universal tools and fixtures so actual tooling required for any specific part will require a minimum of time to produce.

Blanking operations are based on the use of very thin, unmounted punch and die assemblies made from cold rolled steel and carburized. These dies are laid out, sawed and filed to the finish contour using special techniques so that an average blank die can be constructed in 12 hours' time.

Piercing and forming dies using a standard fixture can be constructed in three hours' time.

Marchant has found that about 80% of any new product can be tooled in its short-run department. This in effect can cut the lead time to approximately 1/10 that formerly required to tool a new product. However, as the new product becomes established and sales volume increases, it must be produced on higher production tools to reduce unit part cost.

The Automatic Screw Machine Department at Marchant has the largest battery of Brown & Sharpe equipment West of the Mississippi.

These machines are single spindle, high speed type with many unique innovations which have been engineered and built in the Marchant plant and attached to the basic machine.

Some of the special attachments are burring heads, eccentric turning attachments, milling heads, cross drilling heads, air feeds, etc.

Of special interest is the eccentric turning attachment which will turn one or more diameters off center while the balance of the part is on centerline.

This piece of equipment is cam and roller operated, being synchronized with the cams which operate the machine itself.

The air feeds which push the stock through the spindle at the completion of each cycle of the layout is Marchant designed and is operated automatically by a lever which releases air pressure through a valve to a plunger, pushing the bar forward, thus eliminating the use of costly feed tubes and feeding fingers.

Milling heads are operated by a shaft and series of gears, driven by special motors and can mill slots, slab mill, etc. by merely stopping the spindle of the machine during the mill operation.

The cross drilling is done in the same manner as the milling except the attachment is mounted on a cross slide and operated at right angles to the work piece and eliminates a hand operation in the drill press department.

All of the above mentioned features tend to eliminate costly hand operations and minimize handling of the work.

Upping quality, quantity . . .

SAVINGS AND QUALITY are mounting up for Controlled Products, Inc., Los Angeles, since they switched from hand forgings to the use of aircraft quality plate in the production of nacelle pod assemblies.

Quality is enhanced by equally high longitudinal and transverse ductility of the plate; and savings are up due to lesser stock removals resulting from close tolerances available in a plate section as compared to a hand forging.

Here are some of the savings and quality features:

Time savings of 25 to 30%. The plate is machined by the Hydrotel method and requires 25 to 30% less than that required for the machining of a forging made for the same end part.

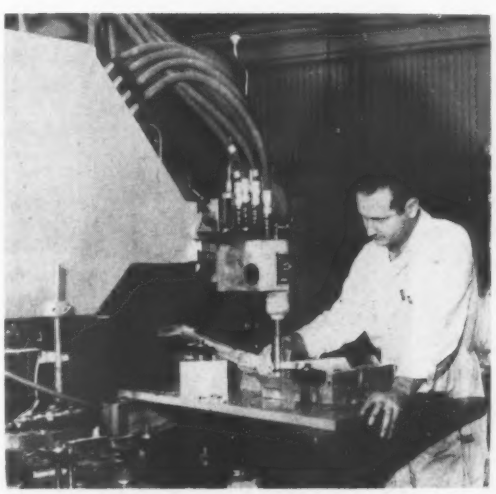
Material saving. There is a material saving of approximately 220 lb. through the use of a part cut from a plate over the use of a forging. This represents a saving of the cost for this additional amount of material plus the machining time required to remove it to obtain the finished part.

Strength factors. The following table shows the strength of forging vs. that of the plate. The most pertinent is the bi-directional ductility of the plate as compared to the forging.

E-4340 AIRCRAFT QUALITY FORGING				
	Yield Pt.	Tensile Str.	Elongation	Red. of Area
Longitud.	262393 psi.	271265 psi.	11.4%	40.6%
Long Tran.	266332 psi.	271669 psi.	5.0%	5.3%
E-4340 AIRCRAFT QUALITY PLATE				
Longitud.	236790 psi.	273972 psi.	11.0%	35.4%
Long Tran.	236472 psi.	270541 psi.	10.0%	43.1%

The plate used in this operation is A. M. Byers Co. Amballoy Bi-directional plate. Configuration cutting of this part was done by Shultz Steel Co., South Gate, Calif.

QUALITY AND QUANTITY production of nacelle pod assembly was improved considerably through use of "Amballoy" E-4340 aircraft quality plate which replace hand forgings.



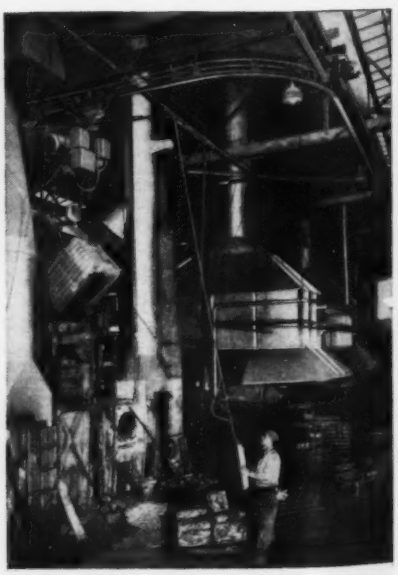
. . . for more details, adv. pgs. 44 and 45, circle No. 23

PETERSON TRACTOR AND EQUIPMENT CO., SAN LEANDRO, CALIF., is saving about 15% of time required for complete overhaul on Caterpillar equipment with four 3-ton 50 foot motorized Cleveland Tramrail cranes.

CLEVELAND TRAMRAIL SERVES

REFRIGERATION ENGINEERING, INC., LOS ANGELES, solved the problem of handling high condensers under a low roof by this special high-lift 3-ton crane. Distance floor to truss 11′ 10″. High position hoist hook 10′ 0″ above floor.

KORTICK MANUFACTURING CO., SAN FRANCISCO, saves $5000 yearly on steel purchase cost and cuts unloading time 2 hours per car with a 5-ton 50-ft. span motorized transfer crane. Shown interlocked with track extending through doorway over railroad.



FEDERATED METALS DIVISION, AMERICAN SMELTING AND REFINING COMPANY, SAN FRANCISCO, charges a melting furnace with a motor-driven Tramrail carrier. Tote boxes are hoisted and emptied by two individually operated hoists.

A LOS ANGELES WIRE MILL picks up 3500 lbs. of rod at a time with a tilting hook that can be hoisted, lowered and rotated 360° with a 76 foot crane.

THE COLD METAL PRODUCTS COMPANY OF CALIFORNIA, LOS ANGELES, stores more steel strip in their warehouse, reaches any coil quickly and reduces damage from dents to the highly finished metal by use of two 6-ton motorized Tramrail cranes.

THE LOS ANGELES TIMES has been saving time for 15 years with an overhead Cleveland Tramrail crane system. The equipment is used for handling printing rolls and press parts when making repairs.

LOCKHEED AIRCRAFT CORPORATION, BURBANK, CALIF., has been handling giant aircraft and aircraft sections for many years with overhead cab-operated Tramrail cranes.

THE WEST . . . . .

SPEEDS PRODUCTION — SAVES FLOOR SPACE — IMPROVES SAFETY — REDUCES FLOOR CONGESTION — CUTS COSTS

From Mexico to well above the Canadian line the West is dotted with hundreds of varied installations of Cleveland Tramrail overhead materials handling equipment serving nearly every type of industry. Many of these installations have been in continuous service for over 25 years.

Cleveland Tramrail consists of track, switches, carriers, cranes, hoists, grabs, etc. which can be combined in a thousand-fold ways to exactly suit your need. As illustrated, it can be assembled into all variations from simple manually or electrically powered, floor-controlled equipment to cab-operated and automatic plant-wide systems.

You will be amazed how fast Tramrail equipment pays for itself and at the many advantages it provides. Any of the WESTERN REPRESENTATIVES LISTED BELOW will be glad to show you nearby installations. Why not make an appointment now and get first-hand information from unbiased users? No obligation, of course.

Western Cleveland Tramrail Representatives:

LOS ANGELES
Cleveland Tramrail California Co.
6435 Corvette Street
Los Angeles 22, Calif.

SAN FRANCISCO
Cleveland Tramrail California Co.
870 Market Street
San Francisco 2, Calif.

SALT LAKE CITY
R. B. Rees & Co.
2906 Delsa Drive
Salt Lake City 17, Utah

DENVER
Cleveland Tramrail Denver Co.
1700 Fifteenth Street
Denver, Colorado

SEATTLE
Cleveland Tramrail Northwest Co.
300 Michigan St.
Seattle 8, Wash.

VANCOUVER
N. C. Sherman, Ltd.
1156 W. Pender St.
Vancouver, B. C.

CLEVELAND TRAMRAIL

Cleveland Tramrail Division • The Cleveland Crane & Engineering Co. • 8876 E. 284 St. • Wickliffe, Ohio

FINISHING

Special abrasive wheel speeds up finishing . . . producing quality finish on aluminum panels . . . cleaning of castings three to four times faster . . .

Finishing with abrasive wheels

HAND FINISHING used to be necessary on parts with difficult contour surfaces—until a special abrasive wheel was developed to do the job automatically and fast . . . with 25% time savings.

At the National Seal Division of Federal Mogul Bower Bearings, in Redwood City, Calif., hand buffing was necessary on oil seals . . . and the work was slow. Now, 90-100 units per min. pass down a chute and are automatically brought up against a large PG wheel formed from over 1,000 die-cut, cloth-backed, coated abrasive segments locked in a hub.

The action of the coated abrasive leaves, combined with the wheel's ability to flex and conform, makes it possible to produce a finish of 20 to 30 rms.

Similar concern with keeping up with the latest developments in abrasives is felt at Prescolite Manufacturing Co., Berkeley, Calif., where lamp fixtures are finished on special band and wheel abrasives.

Take the shades made from prime spinning steel. The company tried a heavy belt and found it left deep scratch marks on the metal surface, while fine textured belts wouldn't do the job at required speeds.

The company found a profitable compromise in a 220 grit belt, which not only speeds production because of maximum belt life, but also imparts a surface requiring least amount of buffing.

In another buffing operation at Prescolite the buffing of recess fixture trims has been speeded up 33% by using a 16-in. bias buff in conjunction with a red buffing compound called Tripoli—and it eliminates polishing operations because the finish is so fine. **John Oswald,** plant manager at Prescolite says he's faced with a continuous problem—that of trying to automate the plant's metal finishing operations.

"Cost of shaping the units we make is low," Oswald said, "but cost of finishing is high. We have already automated our cup polishing operation, and we have a double frame polishing unit which is a step toward what we are trying to achieve. But," he added, "we are still very dependent on having available the abrasives best suited for the job."

In all the cases mentioned, abrasives are those manufactured by the Minnesota Mining and Manufacturing Co.

Another example of a business largely dependent on finishing is the Stainless Polishing Corp., in Oakland, Calif., where owner **Howell Byrnes** supervises the finishing of stainless steel in 10-ft. lengths.

"We give sheets a standard No. 4 finish," Howell said, "unless some other special finish is needed. That means using an 80 grit belt (38 x 126 in. wide) to get out marks left at the mill and a 100 grit belt to polish out what deep scratches are left after the 80 grit belt has been used. In final finishes, we've found 150 grit finishes are best if made from silicone carbide—and it gives the steel a better color."

FAST FINISH—Buffing of recess fixture trims has been speeded up 33% at Prescolite Mfg. Co., Berkeley, Calif., using red buffing compound, Tripoli.

A palm type oil is used on the metal being polished at Stainless Polishing Corp., which conditions the belt and improves the finish, which is important when doing dimensioning (controlling sheet thicknesses to within .0002 in.)

Problems Howell still faces, such as lack of uniformity in tension, failure of joint adhesives and resulting marks being left in sheets, are gradually being overcome as the grinding technique improves.

Here are a few pointers if you're thinking about changing abrasives:

1. There are five minerals used to do the job of cutting . . . flint, emery, garnet, aluminum oxide and silicone carbon, but only the last two are suitable for metalworking.

2. Backings are the base for the mineral and are classed in four groups . . . paper (A, C, D, E, weights) cloth (X and J weights), fibre, and a combination of cloth and fibre.

3. Coated abrasives have two bond layers which lock the material to the backing. One is called a bond coat and the second a size coat. Bonds used are . . . glue, glue and filler, resin over glue, resin over resin and waterproof.

Federal Mogul Bower Bearings, Prescolite Mfg. Co., and the Stainless Steel Polishing Corp., have made the most profitable use of the highly developed abrasives now available—but have you?

Quality finishings on aluminum panels

by
O. C. Fox
Process Engineer
Manufacturing Division
Ampex Corp.

PRODUCING A FIRST CLASS finish on sand cast aluminum panels was causing delays at Ampex Corp., Redwood City, Calif.

The castings are porous and contain air pockets. Thus, before the enamel could harden in the baking oven and seal the casting, the air expanded and raised numerous blisters on the painted surface. This created a difficult rework situation.

E. W. Friberg, general foreman of fabrication, suggested sealing the castings with a coating of polyester resin before painting began. After testing, the following procedure was developed and is being used today with considerable success.

(1) The casting to be painted is thoroughly degreased in a trichlorethylene vapor degreaser to remove any oil remaining from the machining operation which would affect the bonding of the resin to the metal.

(2) The surface of the part to be coated is next sandblasted with No. 30 Del Monte sand to produce a roughened surface for better bonding. Any dust is blown off the parts before they are stacked prior to their being delivered to the painting area.

(3) When a sufficient number of pieces are ready for spraying, American Cyanamid No. 7-832 polyester resin is mixed, a quart at a time, with one ounce of methyl ethyl ketone peroxide catalyst which creates the heat necessary to harden the resin.

This mix is poured into a DeVilbiss type KR suction feed cup equipped with a type JGA 502 spray gun which uses a No. 30 air cap. With the gun set to deliver a narrow fan and the air pressure at about 50 psi., the spray operation begins.

(4) The operator holds the gun 8 to 12 in. from the horizontally-placed work and, using proper spray painting technique, applies a coating of resin over the sandblasted area to a thickness of 20 to 40 mils.

The work is carefully inspected from various angles to be certain no holes remain in the resin coat. If any holes at all are seen, they are filled by running a gloved finger over them and spraying more resin on that area to build up the coating again if necessary.

When the spraying is complete, the parts are racked horizontally and kept at room temperature (65-85° F.) overnight to allow the resin to harden. Any excess drops or runs are then filed off the edges, the coating is sanded with 150 grit paper and the usual priming, surfacing and finish enameling begins.

(5) After the priming and surfacing of the first class finish (front) side has been completed, the part is finish enameled all over and, since no blistering has ever been experienced on the back, it has never been resin coated.

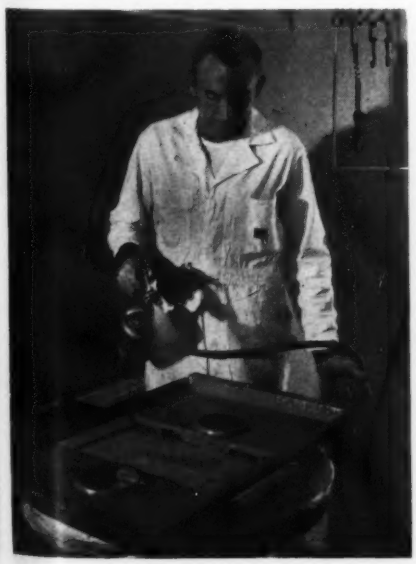
Several other points should be noted. Since the resin may begin to set up in 20 to 30 minutes, only one quart of mix per operator is prepared at a time.

The guns are cleaned with acetone or methyl ethyl ketone between charges to preclude the chance of fouling the gun. Should a blister develop during painting, the defect is removed down to the metal with the point of a knife. The hole is filled with a drop of catalyzed resin which is allowed to harden and is then sanded level.

It is advisable to avoid resin build-up at places on the part where an inside radius is found. Such heavily-coated areas can crack and spoil the seal. It is then necessary to remove that portion of the coat and patch it with catalyzed resin.

Since any holes in the coat are weak points, filling them is essential to insure the best possible seal and prevent paint blistering during subsequent painting operations.

APPLYING FINISH—Polyester resin is applied to sand cast aluminum panels to seal the casting prior to painting.



Cleaning castings 3-4 times faster

CLEANING OF CASTINGS is now three or four times faster at Superior Electrocast Co., South San Francisco, thanks to a new method.

In the old method, the company would grind risers on castings. This presented two problems: (1) the long time it took to successfully grind off the slag, and (2) the fact that risers had to be put at certain parts of the casting so the grinders could get at them.

But with this new method, both problems are eliminated. The new process consists of cleaning up the castings with a gouger-welder. This gouger-welder not only takes off the risers, but it can torch-scarf or gouge sand holes, cracks, shrink holes, etc. And it can be used for all other welding purposes!

The gouger-welder is a silicon rectifier-type machine which supplies enough power for cutting with carbons of ½-in. or smaller. It operates at 100% duty cycle up to 600 amps. In addition, it can be used for manual, semi-automatic or stud welding up to ⅝-in.

The unit features unique controls, transformer, rectifier, and electrical connections specifically designed to stand up under the heavy loads imposed by carbon arc cutting. The extra-capacity silicon rectifier has a 35% margin of safety above requirements — and is especially designed to withstand the unusual transits developed in arc gouging.

Superior Electrocast has found many uses for this machine and has been able to improve old operations all along the line. The particular unit used at Superior Electrocast is designed and manufactured by Metal & Thermit Corp.

BONDING

Use of exotic metals has created new problems in bonding. Here's how one firm solved them . . .

THE USE OF NEW "EXOTIC" metals in the West has created new problems in bonding.

At Boeing Airplane Co., Seattle, Wash., such problems are being met by research like that which recently led to special developments in the bonding of titanium alloys.

A panel assembly was needed for the wing leading-edge flap of a proposed new Boeing jet-powered aircraft, and it was determined that the best metal to use would be titanium—in both the core and skins. But a special bonding adhesive was necessary.

The completed panel had to be able to withstand at least 500 deg. F., and that meant an inhibitor had to be found to prevent the adhesive from breaking down.

Tests were conducted and it was discovered that a satisfactory inhibitor is a gold barrier coating which is applied as a vapor to the surfaces of the titanium parts under heat and negative pressure.

This vacuum vapor plating process, in which 24 carat gold is used, is a unique application of an old process by Boeing research engineers, who found that the vapor coating is best applied prior to the bonding process. First step in this bonding process is setting up a jig which can be used to prefit detail parts as well as to hold them during assembly. Any rework which might be necessary will show up during prefit, and after prefit, the detail parts are cleaned to a pure, bright finish in preparation for the vacuum vapor plating process. The cleaning process was new. Due to the thinness of the honeycomb, neither polishing nor pickling was possible.

Certain requirements are critical for the bonded assembly: Bond continuity will be determined by relative fit of the parts, and are therefore dependent upon precise tolerances in prefit . . . and bond quality will be determined by the absence of contaminants on the parts and tools, making it imperative that cleanliness be stressed in assembling and bonding of the panel.

From the time that the core is cleaned before heat treatment until the final assembly, it must not be touched with bare hands. From the time that the titanium parts are pickled until the time of final assembly, they should never come into contact with human skin. Also, any parts that come into contact with these details must be absolutely clean.

Another prime factor in the success of this assembly operation is a scrupulous observance of the shelf life time. Should the valid shelf life time of any detail expire once the assembly has commenced, it is impractical to replace it because the shelf life time of all the other parts will be incompatible with the replaced part and it will be impossible to salvage the assembly.

Should any of the sub-assemblies become contaminated before plating, the entire assembly will have to be scrapped. And in the same way, if any of the gold-coated parts becomes contaminated, including any that are lost in the diffusion cycle, the assembly will have to be thrown away. This rejection of the entire assembly is because of the short shelf time life.

Prior to vacuum vapor plating, some detail parts in fabrication of the wind leading-edge flap at Boeing Airplane Co. are riveted into a subassembly. Titanium rivets are used and must be heated before the heads can be upset. A special rivet jig is used which heats the rivets to the correct temperature before pressure is applied to head them.

Where additional subassembly work is necessary before vapor plating, such as attaching a doubler to a spar, spot welding apparatus is used.

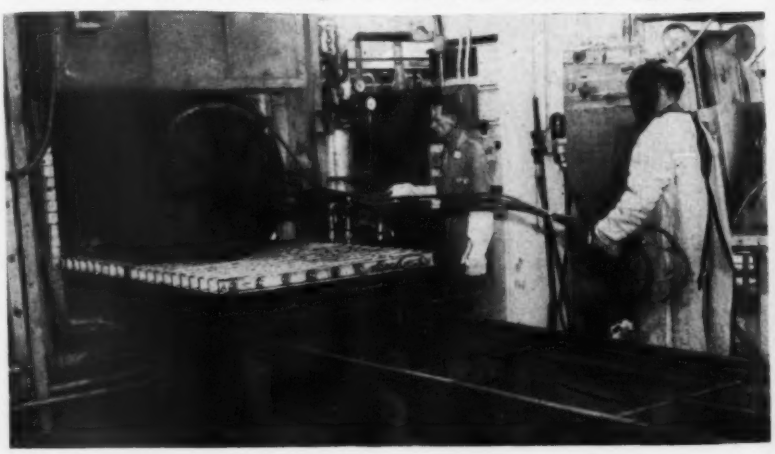
After application of the gold vapor barrier, the detail parts must go through a diffusion cycle. Parts go into a hermetically-sealed retort where they are heated to 1,000 deg. F. in an inert atmosphere to prevent contamination by air. Under the heat of the furnace, molecules in the gold plating diffuse with molecules of the titanium to form a bond.

The diffuser retort containing the vapor plated parts is placed inside a pressure muffle prior to insertion into the furnace. The retort contains an atmosphere of argon gas and pressure is slightly positive so that all oxygen is expelled. Tubes attached to the retort allow introduction of argon gas while the unit is in the furnace. When the diffusing cycle is complete, details of the assembly are removed from the retort and the titanium core is placed in the frame assembly, with adhesive on the faying surfaces.

Then the doublers are located on the assembly, with adhesive on the bond line faying surfaces, and spotwelded to the spar forming the major subassembly. And—note—the spot welded faying surfaces must be kept free of adhesive.

These are the six steps involved in the titanium bonding process at Boeing Airplane Co., Seattle.

THE DIFFUSER RETORT containing the vapor plated parts is placed inside a pressure muffle prior to insertion into the furnace. The retort contains an atmosphere of argon gas. Pressure is slightly positive so all oxygen is expelled. Here the pressure muffle containing the retort enters the furnace. Note the tube leading to the muffle for the introduction of argon gas.



FORGINGS

Hydraulic descaling eliminates pitting . . . New heat treating for Space Age forgings . . .

SCALING HAS ALWAYS presented a problem in achieving pit-free forgings, and special difficulties have been encountered when pipe is heated, because scales form on both outside and inside surfaces.

Often, scale pits aren't discovered until the forged steel is machined, when the machining tool hits the pitted spot and is broken. Then it's too late—expensive damage has been done.

Here's how the American Brake Shoe Co., Azusa, Calif., has approached the problem of descaling. Take the way they handle the upset forging of alloy tube:

Prior to upset, a forging process where horizontal instead of vertical pressure is needed, the tube is taken out of an oil fired furnace, and put into a hydraulic descaling unit. Here it is cleaned both internally and externally by water sprayed at 1,800 - 2,000 lb. per sq. in. pressure.

Anybody who has tried forging tube knows the difficulty involved in clean-up. Getting to the inside surface of the tube is almost impossible, and without the hydraulic descaler the alloy tube forged at American Brake Shoe Co. couldn't be made.

With the descaler unit, parts do not have to be mechanically cleaned and are acceptable in their "as forged" condition. In addition, because they are pit-free there is no danger of machine tool damage.

Although these hydraulic descaling units are only one of many tools used in the forging industry to produce quality products, they warrant a closer examination. The descaling operation takes only seconds, and the heat loss between furnace and upset forging is small.

Key elements in the process are water and extremely high air pressure. In a room set back from the forge shop at American Brake Shoe Co.'s plant in Azusa, multi-stage pumps build pressure in an accumulator unit to a peak of 2,000 psi.

This, when coupled with hydraulic pressure built up in another pump, is sufficient to provide a force of 1,800 psi. in at the descaler nozzles. Transmitting pressures of this kind is achieved by use of 2½-in. welded pipe as a main system, with 1¼-in. offshoots from the mainline which lead to the outlet points where descalers can be used at each forge unit in the main shop.

Where particularly small diameter material is to be descaled before forging, rotating circular wire brushes are used in a fixed frame. Hydraulic descaling would cool the metal too fast, even though heat loss on large diameter metals in the hydraulic unit is small.

Note . . . hydraulic descalers are not limited to use with upset forges, but can be used equally as well prior to mechanical press forging.

The result of such high quality descaling operations is finished forged parts almost entirely free from scale pits — and with increased close tolerance demands being made by missile and aircraft manufacturers every day, successful descaling means the difference between acceptance and rejection of many forged parts.

HYDRAULIC DESCALING UNIT is activated when operator stands on trip pedal. Second man is "heater operator" and is feeding bar into descaler. This unit can often be operated by one man.

Heat treating Space Age forgings...

By Gordon von Planck
Metallurgical Consultant
Coulter Steel & Forge Co.

THE NEWER ALLOYS AND METALS—which a few years ago were largely in the laboratory experimental phase—are now making demands on the operation of present day forge shops.

The stepped-up demand for higher speeds in the aircraft jet age with its concurrent requirements for metals to withstand greater heat resistance at supersonic speeds, as well as the higher temperature resistance required for components of jet and rocket engines, has set many metallurgists and engineers to seek the ultimate in these requirements.

Among the forge shops in California, is the plant of the Coulter Steel & Forge Co., located in Emeryville on San Francisco Bay.

This company, headed by **J. V. Coulter,** president, and **Philip R. Freeman,** vice-president and genager, is typical of the modern open hammer shop. The four open-frame, singe-arch hammers, from 6,000 lb. down to 1,500 lb., are well suited to forge not only carbon and alloy steels, but also high alloy tool steels, together with the various aluminum alloys, ferrous and non-ferrous alloys, and many of the very new high-temperature alloys. Some of the rarer metals such as titanium, vanadium, molybdenum, columbium, etc., have been successfully forged.

All of these alloys and metals require extra care in heating for forging and close control of forging temperature. All heating furnaces are pyrometrically controlled and the furnace atmosphere must be held as near neutral as possible on certain metals such as titanium, molybdenum, etc., to avoid excessive oxygen pickup. Gas analysis of the furnace atmosphere can readily determine if the optimum combustion ratio is being maintained.

The heat treating of carbon, alloy, and stainless steels is more or less standard procedure in most forge shops. However, even these steels, particularly tool steels and

stainless, require close control of time and temperature. Strongly agitated quenching oil and water are most important in getting uniformity in results, and even small variations in tempering temperature can cause erratic results.

Frequently, the 300 series of stainless steels, such as 304, are required to be cold worked to a higher tensile strength than can be obtained in the annealed condition. This is done under the hammer with the steel heated slightly (200 to 500 deg.) and the percentage of reduction in cross section area determines the increase in tensile strength that can be obtained.

Some higher alloy steels do not respond to heat treatment, such as 19-9DL. These materials obtain their desired physical properties only through forging (called hot-cold work) in the range of 1400° F to 1600°F. This also requires close control of both temperature and percentage of reduction of area.

After forging, most of the aluminum and other high alloy metals require extreme care in both annealing and subsequent heat treatment. At the Coulter shop, an electric furnace utilizing resistance coils for heating and contained air circulation, with pyrometer control, is used for annealing, solution treating and aging for all aluminum alloys.

The importance of rapid quenching in cold or warm water after solution annealing cannot be over-emphasized, and a maximum of 10 seconds from furnace to quench is mandatory to insure proper response to aging. Small forgings or light sections can be quenched in cold agitated water, but large forgings should be quenched in 150°/180° water to avoid quench cracks from shock.

After quenching, the aging treatment for aluminum alloys requires generally a long time at a precise temperature in order to meet the requirements for T-6 temper (the fully aged or hardened condition). The electric furnace is ideal for this treatment because of its ease of accurate temperature control.

Many of the super-alloy metals require unusual care in forging, for some of these alloys contain little or no iron and have bases of nickel and/or cobalt together with molybdenum, chromium, manganese, etc. The temperature range in forging is very small and repeated reheating plus light hammer blows are required

Gordon von Planck
Metallurgical Consultant

to avoid failure. At the critical forging temperature, most of these high-temperature alloys move under the hammer quite well, but at 100° lower temperature they scarcely move. Also, exceeding the critical forging range will frequently cause excessive grain growth with resultant loss of ductility.

Then, too, some of these super alloys are subject to critical strain, due to a degree of cold work followed by heating without subsequent hot work. The result can be excessive grain growth and poor ductility which does not show up until after heat treatment.

While many forgings of super alloy are sold in the annealed condition for better machinability, frequently they are ordered in the aged condition. This generally requires close control of the aging temperature as well as a long period of time to fully age and develop maximum properties.

At the Coulter shop, all heat treating furnaces are controlled by pyrometers and recorders. These are frequently checked for accuracy with standard thermocouples and potentiometer. Accuracy in the aging of alloys such as 17-7PH, 17-4PH, etc. is imperative if satisfactory physical results are to be attained. Often a test bar can fail through a variation of only 10° in the final aging temperature.

In the forging and heat treatment of alloy steels, aluminum, super-alloys, and unusual metals, it is almost imperative today that metallurgical control of all operations of forging, annealing, heat treatment and aging or precipitation hardening be maintained. Time and temperature determine the ability of these newer alloys to develop their maximum physical properties and it is a metallurgical maximum that "there is no short cut to heat treatment."

In the final analysis, if the forgings meet the specified tests of ultrasonic soundness, tensile and yield strength, ductility, high temperature creep strength, impact value, etc., the forge shop can only then say, "Well done."

Your next beer can may be aluminum

YOUR NEXT BEER CAN might be lighter. It's because it may be made of aluminum.

The Adolph Coors Co. has solved the problem of producing their cans from aluminum. The new cans are 40% lighter than a similar sized coventional metal container and thus provide tremendous savings in shipping costs.

Another major feature is that it's possible to reprocess them. Coors is offering a one cent refund on each can at dealers in the initial test distributions being made in the Denver market now.

The latter feature is expected to have conservation value in that some 42 billion cans are used annually according to the Can Manufacturers' Institute.

It is also hoped that the refund feature will be a major factor in cutting down can litter along highways and picnic grounds.

During the four years of development the company had to solve a number of problems to make the aluminum can economically feasible. Among these was development of a casting wheel to produce a continuous, unbroken, thin, wide strip of metal.

The strip produces metal slugs, as big around as the circumference of the container. These slugs, about ⅛ in. thick, are blasted into a seamless container through a process known as impact extrusion.

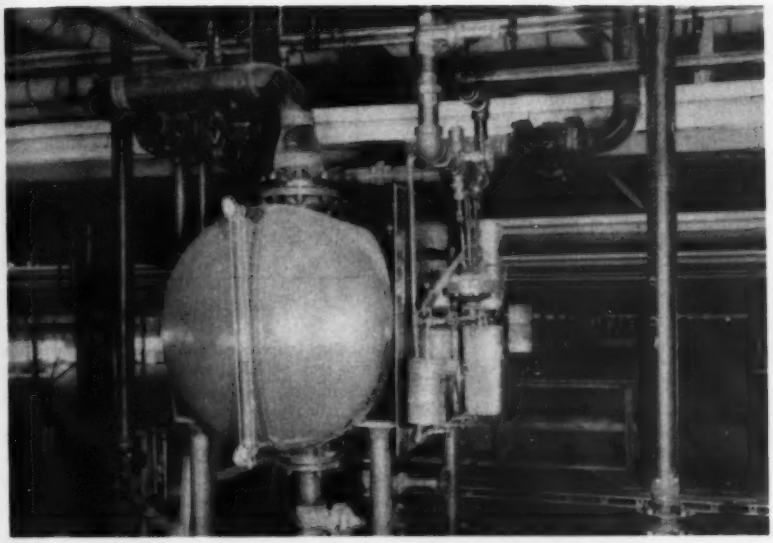
Another economy problem solved by the firm was development of a lithographic press to apply four colors to the container. Another was finding a way to place the lid on the seamless can.

In the brewing industry the aluminum can permits sale of draught beer in cans for the first time, since sterilization is accomplished by ultra-infiltration instead of the usual pasteurization process. This also is expected to permit changes in canning procedures of a number of food and other products.

. . . for more details, adv. opp. pg., circle No. 24 →

BYERS GUIDE

Maintenance and Operating Tips from A. M. Byers Company



One of two batteries of condensate pumps installed in each of five similar buildings at General Electric Appliance Park, Louisville, Ky. To protect against damage from steam condensate corrosion, Wrought Iron Pipe has been installed for the return lines within each building and to the area's central boiler plant.

Seven Ways to Minimize Maintenance In Steam Condensate Systems

While selection of the right piping material precludes virtually all other factors in controlling condensate corrosion, additional service life can be squeezed from your existing system by following these helpful suggestions:

1. The feed water deaerator should be operated at or near boiling point, and should be maintained in an efficient condition.
2. All joints in return lines operating under sub-atmospheric pressures should be made airtight.
3. All horizontal return lines should be given sufficient slope or pitch to permit rapid and complete drainage.
4. All low points or pockets in the lines where condensate can collect should be eliminated or properly tapped.
5. Reaming of pipe ends to remove burrs is particularly important in condensate lines.
6. Cold water injection into return lines ahead of vacuum pumps should be avoided wherever possible.
7. Extra heavy nipples should be used in return lines.

Practically any application where steam condensate is conveyed through pipe is a "natural" 4-D Wrought Iron application. Here are two reasons why:

1. Ordinary metals corrode quickly and become costly maintenance headaches. Alloy steels increase initial costs greatly.
2. 4-D Wrought Iron's corrosion-blocking film forms around the interior wall of the condensate line enabling the pipe to give long, maintenance-free service.

Incidentally, since the right piping material means so much to service life in steam condensate systems, you may wish to contact our Engineering Service Department staff. They maintain records and data spanning 60 to 75 years which show how long various materials endure in steam condensate service.

How D. L. Clark Co. Cuts Maintenance Costs 50%

"Because of the excellent service life of 4-D Wrought Iron Pipe in the plant, fewer pipe fitters and helpers are needed," says the mechanical superintendent at the D. L. Clark Company, Pittsburgh, Pa.

Here, at the home of the famous Clark candy bar, 4-D Wrought Iron Pipe, one-half inch to six-inch sizes, and 4-D Wrought Iron nipples are kept in stock. This pipe material is used for steam lines, condensate return lines, air lines, hot and cold water lines, and chocolate lines.

Mr. Robert Dunbar, the plant's mechanical superintendent, credits 4-D Wrought Iron with cutting maintenance costs approximately 50 per cent in his operation.

4-D Wrought Iron proves especially effective at the Clark Company against that old bugaboo, condensate corrosion. Let's review the nature of this nemesis for a minute. After steam loses its heat, it turns to moisture, which is distilled water greedy for gases. Any gas in the steam is readily absorbed into the condensate as it is cooled. The condensate becomes violently corrosive, depending upon the percentage of free CO_2 plus O_2 contained in the steam. Becomes downright costly, too, if allowed to rampage. 4-D Wrought Iron doesn't let it.

A Forging Tip or Two

In order to forge 4-D Wrought Iron successfully, it is necessary to heat it to at least 2300°F., and stop working it when it reaches a temperature of 1750° to 1800°F. At 2300°F., 4-D Wrought Iron gives a greasy heat. From 2500° to 2600°F., it will sweat.

Higher temperatures are essential in forging 4-D Wrought Iron because of its low carbon content. 4-D Wrought Iron with its low carbon content will take much more heat without burning than other materials with higher carbon. At the right temperatures, 4-D Wrought Iron is a cinch to work and form.

BYERS GUIDE

Maintenance and Operating Tips from A. M. Byers Company

How to Dry Sand With No Piping Downtime

Norton Company, Worcester, Mass., has a tough assignment for heat exchanger tubes: in a sand drier that removes moisture from the abrasive materials used in grinding wheels, refractories, laboratory ware, non-slip tile, and other products. The tubes, which carry steam or hot water, are housed in a rotating shell filled with the sand.

Tubes in this service are subject to the punishing corrosive action of the moisture in the sand as well as the abrasion of the sand as it rushes over the coils. The inside walls of the tubes are also subject to corrosive action because of the condensate they carry.

Water or moisture in the sand usually has a chloride content. And 4-D Wrought Iron's proven resistance to salt and brine effects provides an excellent basis for comparison in this service.

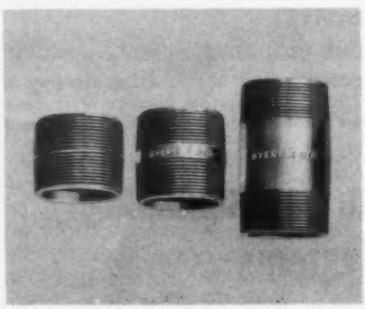
If corrosion or abrasion is playing hob with your piping coils, it could be you're using an inadequate piping material. Maybe it's time you investigated the advantages of 4-D Wrought Iron.

Right Pipe, Wrong Nipples, Premature Failure

In a steam condensate line installation in North Carolina, specifications called for wrought iron pipe to be used. Steel nipples, however, were selected for this corrosive service.

Within three years, the steel nipples began to fail. They were replaced with wrought iron nipples, and the steam condensate line has experienced no trouble since. Therein lies an object lesson.

4-D Wrought Iron nipples, preferably extra strong, should always be used in *any* piping system because the majority of failures occur at joints which should really have *extra* protection.



Identification is important, too. Here's how to be sure you get what you order. Byers 4-D Wrought Iron nipples, other than close nipples, are machine stamped with the word BYERS and STD for standard weight, or X STG for extra strong pipe. Close nipples bear a red band around the center. Couplings up to and including 14" are stamped with a "B" within a keystone. If you want durability—all the way down the line—insist on 4-D Wrought Iron nipples.

WHAT IS "4-D"?

Note: New 4-D Wrought Iron was achieved by substantially increasing the deoxidation of the base metal, slightly increasing the phosphorous content, and using a more siliceous iron silicate. Result is increased corrosion resistance, improved mechanical and physical properties.

Literature Available

Literature described below is available on request. For information on specific applications, write Byers Engineering Service Department.

New four-color booklet, **4-D Wrought Iron: A New Dimension in Corrosion Control,** discusses in detail Byers' latest product development. Includes a test section which is graphically illustrated and shows comparative corrosion resistance of 4-D Wrought Iron, standard wrought iron and other ferrous metals.

Information on facts affecting corrosion, comparative service records, and suggestions for minimizing maintenance are presented in our special report: **The Use of Wrought Iron in Steam Condensate Lines.**

Complete mechanical data on all Byers pipe and tubular products are available in the **Byers Pipe Catalog.** Discusses differences between 4-D Wrought Iron and steel. Includes specifications, pipe standards and measurements.

New ten-page bulletin, **Cold Drawn Wrought Iron Heat Exchanger and Condenser Tubes,** cites actual installations in which the use of 4-D Wrought Iron and other metal tubing in the same equipment permits service life comparisons. Lists cost-per-foot-per-year figures for each material and the corrosive conditions present.

For additional information on 4-D Wrought Iron, contact Byers Division Offices in the cities listed below.

The maintenance and operating items appearing in BYERS GUIDE were prepared by the Engineering Service Department of

A. M. BYERS COMPANY

Pittsburgh 22, Pennsylvania

ATLANTA • BOSTON • CHICAGO • HOUSTON • NEW YORK • PHILADELPHIA
PITTSBURGH • ST. LOUIS • SAN FRANCISCO • WASHINGTON, D. C.

4-D Wrought Iron is immediately available and may be obtained through established distributors of Wrought Iron Pipe. Plate, bar, and other flat rolled products may be ordered direct.

Corrosion costs you more than Wrought Iron

EXTRUSIONS

Giant extrusion presses extend range of designs . . . eliminate other metalworking processes.

GIANT EXTRUSION presses now at work in the West, reflect the demands the metalworking industries are meeting to keep pace with rapidly increasing production facilities.

At the Harvey Aluminum plant in Torrance, Calif., 8,000 and 12,000 ton hydraulic extrusion presses have extended the range of design previously possible and in one operation it is now possible to form a complex shape by placing the metal only where it is needed, thereby eliminating bulky assemblies made up by joining, welding, or riveted rolled sections.

Larger sections, longer lengths, more intricate configurations, and greater cross-sectional area are now possible.

Designing big aluminum extrusions follows the same consideration setup for conventional extruded shapes, except that limitations have been broadened. The maximum cross-sectional dimensions for big extrusions are governed by a circumscribing circle approximately 32 in. in diameter.

Shapes produced on the big presses include tube; integrally stiffened panels; stepped extrusions; structural sections such as I-beams, H-beams, channels, angles, tees, zees; bar and rod; semi-hollow and hollow; solids; and special configurations.

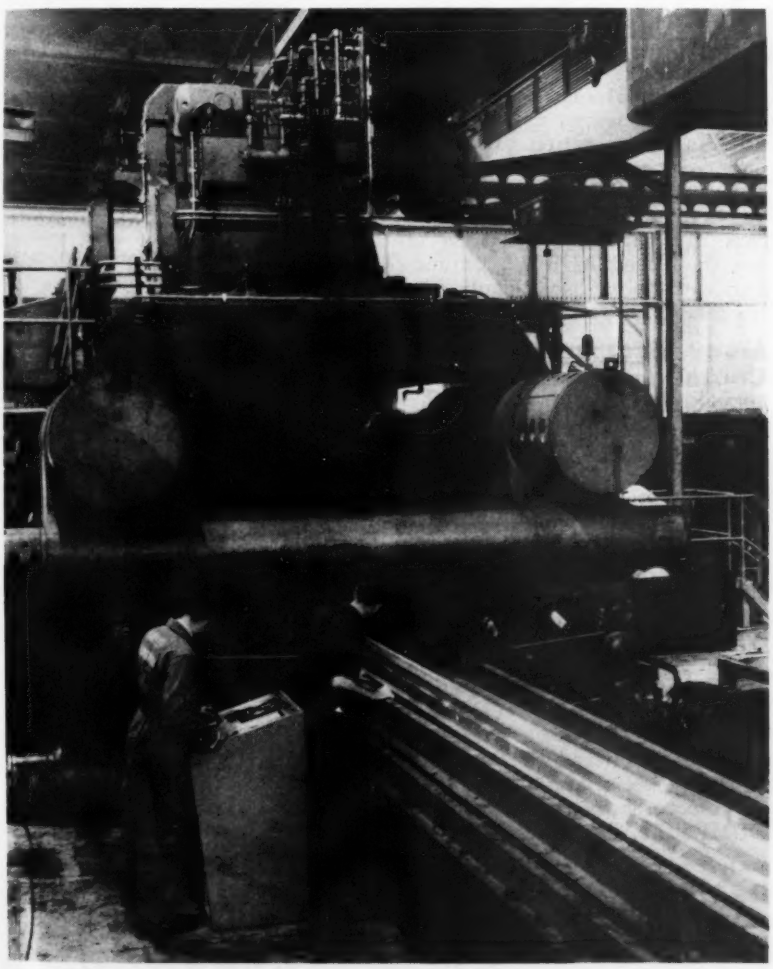
With these giant extrusion presses large diameter extruded tube can be made up to an I.D. of 25 in., while structural shapes can be extruded on the big presses comparable to the largest fabricated steel sections. Generally, they can be used whenever rolled steel shapes are used, with the advantages of better strength-to-weight ratio, custom design, reduced fabricating costs, and maximum resistance to corrosion.

Integrally stiffened panels, in which the skin and stiffening elements are extruded in one piece, offer broad new design possibilities. These wide sections can be extruded flat or in a V or U form and then flattened to produce parts wider than the diameter of the extrusion die.

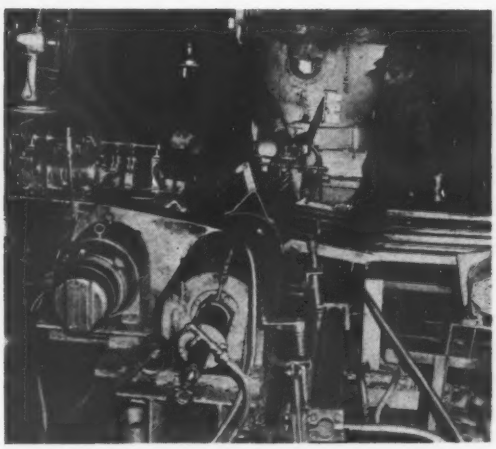
Stepped extrusions, produced by changing the die after interrupting the initial extruding process, usually combines two or more sections in a single extruded length having a large end integral with a forward end of a smaller cross section.

And giant presses mean that extruded aluminum is now available in finished, heat treated lengths up to 80 ft.

THIS HUGE 8,000 ton hydraulic extrusion press has an overall length of 288 ft. and weighs 4,000,000 lb.



FOR EXTRUSIONS — This photo shows the pouring of gray iron castings to be used in extrusion processes. Picture was taken at Dayton Foundry, Hollydale, Calif.

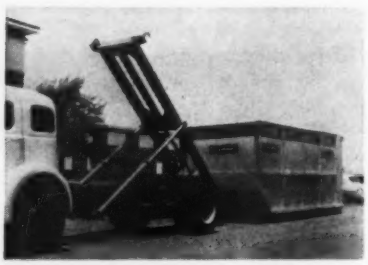


New Invention Picks Up 40 Cu. Yd. Detachable Containers . . . 15-Ton Loads

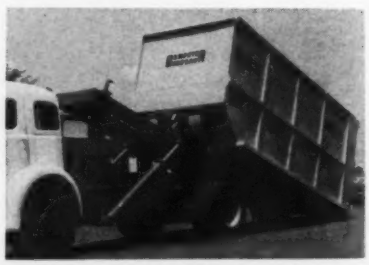
Dinosaur picks up in excess of 30,000 pounds of granular material, white line inside container indicates load has not shifted.

Containerized Cargo, Waste & Raw Materials Handled by DINOSAUR

The newly developed DEMPSTER-DINOSAUR is a system of materials handling that employs giant containers up to 40 cubic yards and larger. It lends itself to any situation where bulk accumulations of raw materials, liquids, waste or finished products must be handled. Since one truck and one driver can automatically pick up, haul and dump or set down a number of containers, the DINOSAUR easily does the work of several trucks.



Dinosaur backs up to loaded container and engages it with lifting bail.



Container is hydraulically pulled up inclined tilting frame.

Container is pulled forward where it automatically locks into carrying position.

DEMPSTER-DINOSAUR Combines Detachable Container Flexibility With Big Pay-Load Capacity

Unlimited Capacity

The proven savings of mechanically handled detachable containers have now been expanded to cover long, over-the-road hauls. Two DINOSAUR models are available for this work. One, for tandem trucks, handles 30,000 pounds; the other, for single axle trucks, handles 22,000 pounds. Special off-the-road models are available for loads limited only by the capacity of the truck.

For Docks and Flat Cars

Mechanically, the DEMPSTER-DINOSAUR is of extremely simple design. Components are a tipping frame, two hydraulic raise-and-lower cylinders and a double-acting cylinder which controls all container movements. No chains, sheaves or cables are used in its operation. It is the only over-the-road system that can push and pull containers on and off docks or railroad flat cars. This makes it possible to use the DINOSAUR in conjunction with "boxy-back" containerized cargo rail shipments.

The Dinosaur hydraulically pushes a container off on a dock and inside a building for unloading.

Many Sizes and Types of Containers are Available

DEMPSTER-DINOSAUR standard containers come in 21 sizes ranging from 14½ feet to 23½ feet in length and 10 to 41 cu. yd. capacity. Special cargo containers up to 35 feet, tank-type and stake side models are also available. Drop-down telescopic legs to hold container at dock height are optional on some cargo containers.

Free Booklet Offered

A free booklet which describes the operation of this new system in detail is offered by Dempster Brothers, the originator and only manufacturer of DEMPSTER-DUMPSTER Systems.

Mfd. By Patents Pending

DEMPSTER BROTHERS, Inc.

Dept. WI-3, Knoxville 17, Tenn.

. . . for more details, circle No. 25 on Reader Service Postcard

Bee's architecture supplies idea for klystron grid-making method

THE BEE'S ARCHITECTURE is playing an important role in a Western manufacturing process.

The cell structures of a honeycomb inspired this ingenious klystron grid-making technique. Performed chiefly under microscopes, this mass production process was pioneered and perfected by Varian Associates, Palo Alto, Calif.

It consists of forming a bundle of fine copper-plated aluminum wires into a solid, honeycomb-like structure, and then etching out the aluminum. The end product is a pure copper grid having extremely low microphonics, high-power handling capacity and great rigidity—essential requirements for airborne klystrons.

Photo at right shows a honeycomb grid compared with a common sewing needle. The diameter of this grid measures about .022 in. and its thickness about 0.0015 in. The total thickness of two of these grids is equal to the thickness of an ordinary piece of writing paper. Grids are manufactured in sizes as small as the sub-miniature grid illustrated and as large as ¼ of an in. in diameter.

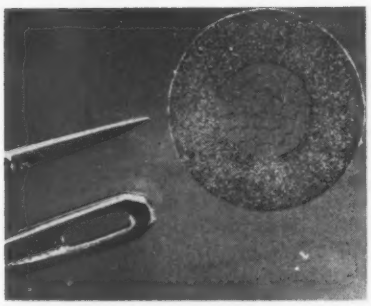
Wafers are placed in the individual cells of a lapping fixture which holds them in place to be ground to a precise thickness.

Electroplating a thin film of copper onto aluminum wire is the first operation in the manufacture of these honeycomb grids. The thickness of the copper plating is approximately 0.00025 in. Electroplating is by means of a plating machine especially designed for continuously plating the wire and which also cuts it to the proper length.

An annealing operation follows the plating which softens the wire so that it may be straightened easily to prepare it for the next operation. This next operation consists of loading a predetermined number of the wires into a section of thin walled copper tubing.

After loading, the grid bar, as it is now called, is ready for drawing and swaging. This drawing and swaging operation reduces the diameter of the grid bar in gradual steps, thus compacting the plated wires into a solid mass within the tubing. It is interesting to note that this drawing and swaging process tends to change the round wires into a hexagonal pattern resulting in the honeycomb structure.

The compacted grid bar is then placed in an automatic cut-off machine which slices it into thin wafers. These wafers are then placed in the individual cells of a lapping fixture which holds them in place to be ground to a precise thickness on the lapping machine.



Honeycomb grid compared to a sewing needle. Diameter of grid measures about .022-in. and is about .0015-in. thick.

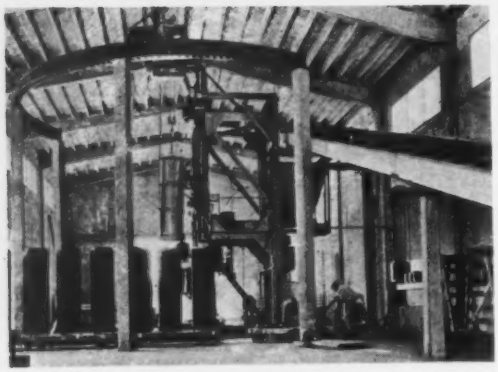
The wafers are now ready for the final operations which produce grids ready for assembly as vital parts of the Klystron. First, the aluminum part of the original wire is etched away. All that remains is the copper honeycomb lattice which is the plated film of the original wire, supported by the round frame of the copper tubing. The grids are then fired in a furnace containing a hydrogen atmosphere. This process sinters the vanes together into a remarkably strong structure.

Of all known methods, only this reproduction of the bee's architecture has proven capable of producing grids that assure the most efficient grid performance and at the same time are reliable under conditions of extreme shock and vibration.

Circular crane ups cement plant efficiency, safety

A 6-TON CIRCULAR CRANE and hoist have upped efficiency and safety at Fountain Sand & Gravel Co., Pueblo, Colo.

The unit is called upon to reduce costs of pouring cement into moulds for the fabrication of re-



Crane and hoist combination at work in the cement plant. The unit pours cement into molds—efficiently and safely.

inforced concrete pipe . . . and to eliminate hazards associated with the job.

In the picture, you can see the simplicity of the arrangement for this new hoist, which is suspended from its semi-circular track and closely mounted to the ceiling of the production area. An operator, in the center, is shown positioning the loaded moulds into movable carts for storage during curing.

When the concrete mixture is properly cured, the carts are moved into position and another operator uses the hoist and crane unit to lift the cover from the pipe section and move it under the mixing chamber to accept additional batches of the aggregate for curing.

The hoist unit, operating from a power supply source of 240 volts, 60 cycle, 3-phase current, is of ample capacity to handle any size of concrete pipe manufactured by Fountain Sand. A conveyor belt, to the right, is utilized by this fabricator to supply the bin hopper with all the aggregate of the mix such as sand, gravel and cement. Water is furnished through a system of proportioning valves.

The crane and hoist were manufactured by the Wright Hoist Division, American Chain & Cable Co., Inc.

Maintenance, construction costs lowered with end-welded studs

MAINTENANCE and construction savings were realized when end-welded studs were used recently for the first time to secure insulation and lagging for a high temperature, pressurized power plant boiler.

At the new Reeves Station being constructed near Albuquerque for the Public Service Co. of New Mexico, stainless steel studs were first end-welded in organized patterns to the pressure casing of the boiler. Several studs were welded per minute with the lightweight stud welding gun. Two 2-in.-thick layers of magnesia block insulation were fitted over the studs and made snug against the pressure casing. Ribbed embossed aluminum lagging, 0.032-in. thick, was then impaled over the studs.

This idea not only brought important economies during construction, but it is also expected to cut maintenance costs during the life of the plant.

Another out-of-the-ordinary feature at Reeves Station is colored aluminum insulated sandwich wall, which saved approximately 15% over conventional sandwich walls. Assembled on the job, it was used for both the administration building and the main power plant building. Additional savings were realized because the aluminum needed no paint.

Inner and outer sheets of aluminum, along with fiberglass insulation, were impaled on studs to form a highly economical field-assembled curtain wall. Savings were approximately 15%.

Stainless steel studs, end-welded in the field to building girts, also secured the curtain wall. It is comprised of an interior sheet of 0.032-in. corrugated aluminum, insulation of 1-in. fiberglass, and exterior siding, with an alodine green finish, of 0.032-in. ribbed embossed aluminum.

To help hold the boiler insulation in place, 1-in. wide, light gage aluminum strips were stretched over the magnesia blocks and impaled on the studs, then secured with speed clips. All buck stays were covered with aluminum wrappers, also impaled on studs, which then served as flashing. When the lagging was in place, aluminum caps were applied to the studs.

Another advantage of this installation was that no hand-welding, wiring or drilling and tapping was necessary to secure the boiler insulation. The aluminum boiler lagging does not require painting, as does conventional sheet metal lagging.

Moreover, significant maintenance economies are expected during the life of the boiler, largely because the insulation and lagging can be easily removed from the pressure casing to facilitate repair and can be reinstalled later with approximately 100% salvage value. No special tools are necessary and since the aluminum lagging is light in weight, small maintenance crews can perform the task. Nelson Setlock studs were used in this construction.

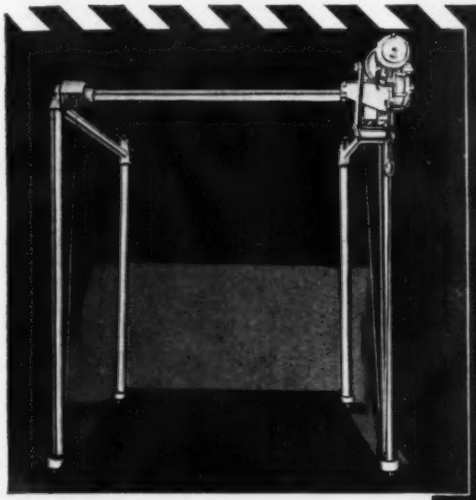
Special techniques produce metallized ceramic pieces

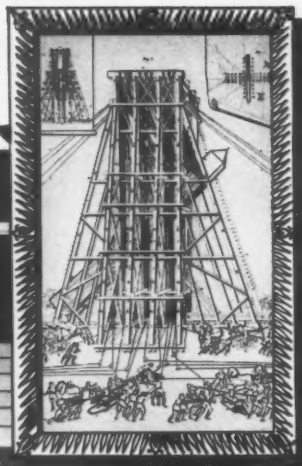
SPECIAL TECHNIQUES have been developed in the production of metallized ceramic parts used by Eitel-McCullough, Inc., San Carlos, Calif., manufacturer of electron power tubes.

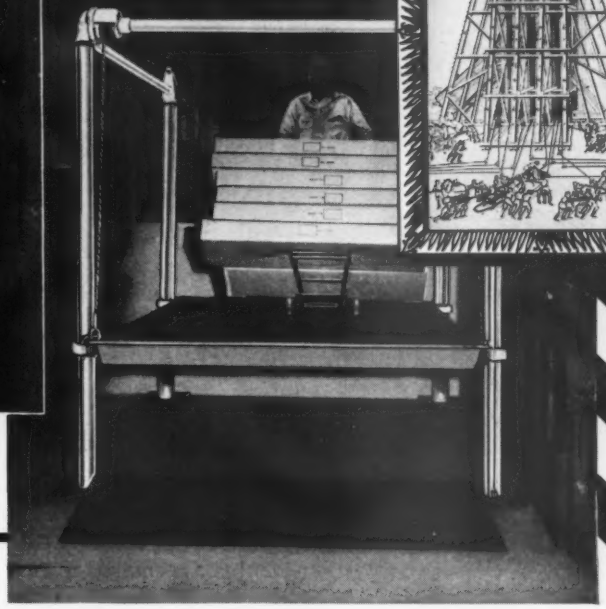
The use of high-alumina ceram-

It was horse- and manpower then . . . it's GLOBE HANDLING now. The Fourth Century Romans raised an obelisk in the Circus Maximus with horses and men. Today Globe Electro-Loaders do the same thing—faster, easier and cheaper.

An 8½x11 reproduction of this engraving, from Jean Rondelet's "Art of Building" published in 1842 will be sent free on request.







LEVEL OFF SPLIT LEVEL FLOORS WITH ELECTRO-LOADERS

MADE AND STOCKED IN IOWA
READY FOR IMMEDIATE INSTALLATION

Globe Electro-Loaders are multi-purpose lifts. They eliminate hazards of steps or makeshift ramps and inclines between split levels in plants, in countless lifting and loading operations. Bolt-anchored to floor, they are easily installed, readily relocated, provide efficient loading and lifting service, reduce materials handling costs.

Made in three basic models, Electro-Loaders lift from 5000 to 6000 lbs. Lifting power to a height of 5'6" is supplied by a 1 hp electric motor, operating a simple cable mechanism. Automatic safety devices assure complete control and safety during the lifting cycle.

The checkered steel plate platform is reinforced with steel beams to stand up under long, hard use. Toe-guards protect all four sides. A 24" wedge-shaped ramp provides an easy upward slope, or the lift may be recessed for flush-platform loading.

Write today for Form No. IND-600. Gives complete information on the advantages you can expect from Globe Electro-Loaders.

GO GLOBE® Pacific

GLOBE PACIFIC HOIST COMPANY
DIVISION OF GLOBE HOIST COMPANY
PLANTS: DES MOINES—PHILADELPHIA—LONG BEACH, CAL.

WRITE TODAY

"CASE STUDIES IN MODERN LIFTING" Factual studies pertinent to your business, including cost and time-saving data, now available.

GLOBE PACIFIC HOIST COMPANY WI-1003P-EL
1461 Canal Avenue, Long Beach 13, California
Please send me:
——Data on Globe Electro-Loaders
——Free copy of "Case Studies in Modern Lifting"
NAME .....
POSITION .....
COMPANY .....
ADDRESS .....
CITY ..... ZONE ... STATE .....

WORLD'S MOST COMPLETE LINE OF INDUSTRIAL LIFTS AND RAMPS

. . . for more details, circle No. 26 on Reader Service Postcard

Automatic high-temperature kiln at Eitel-McCullough where ceramic vacuum tube parts are fired at 1500 deg. C. for three hours, before brazing to metal tube parts.

ic as a vacuum tube material, in place of glass, makes possible more compact tubes which can withstand high-impact shock and vibration without appreciable damage to the tubes. High-alumina ceramic is a low-loss material when subjected to radio frequency fields.

It has extremely high electrical resistance, is very strong mechanically, has attractive thermal properties, and is chemically stable at high temperatures. Exact dimensional uniformity is achieved in the manufacture of the ceramic-metal tubes.

The metal parts used in the manufacture of Eimac tubes are primarily die-formed parts produced by conventional methods in the company's punch press department. The die-formed parts are held to very close tolerances.

The ceramic parts undergo a metallizing process, which involves the firing of molybdenum and manganese into high temperature ceramic (approximately 1500° C), before their brazing or soldering to metal. The 95% AL_2O_3 ceramic will withstand temperatures up to 1650° C.

Ceramic is purchased in the desired shapes and sizes and diamond ground to tolerances of plus or minus .000050 of an inch. At the Eimac plant, the ceramic is cleaned with detergents and acids and the areas to be joined to metal are painted with a mixture of molybdenum and manganese in a nitrocellulose lacquer.

The coating is fired into the ceramic in an automatic high-temperature kiln which achieves a temperature of 1500° C. The Harper-built furnace, only one of its type in use in the United States, is 57 feet long. The ceramic parts are fired for approximately three hours.

When removed from the kiln, the ceramic parts have areas which can then be brazed or soldered to the metal parts of the tube.

A "hard-soldering" or brazing method using pure copper, pure silver, Kovar, stainless steel, molybdenum and alloys of copper-silver, copper-gold and nickel-iron is employed. Normal brazing temperatures range from 850° C to 1100° C. Tensile strength of the ceramic-to-metal seals is normally 10,000 to 15,000 psi.

Two-fold problem in material handling solved by jib crane

A TWO-FOLD PROBLEM in material handling was faced by the Los Angeles Div. of Micromatic Hone Corp.

First, how to move heavy fixtures for flat and I.D. honing machines, etc., as new set-ups were required. Secondly, how to load, unload, and move oil tools, hydraulic cylinders, gun barrels, etc. safely and quickly while keeping manpower expenditures at a minimum.

The answer came in a jib crane, insert type with 360-deg. rotation, of one-ton capacity.

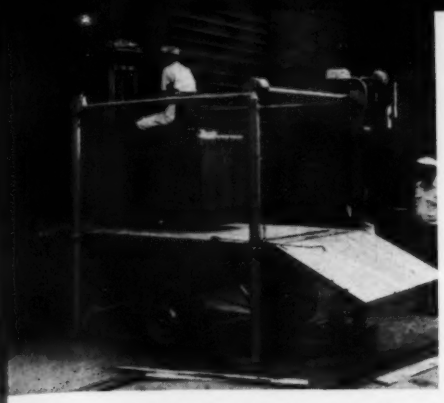
The crane is 13½ ft. high with a 22 ft. boom effective length with minimum clearance of ceiling fixtures and walls allowing loading and unloading at the receiving door and moving heavy equipment to every part of the shop. The King jib crane is equipped with an Appleton cord reel with swivel base, tagline electrification, a Wright electric chain hoist on a King I-beam trolley, and a Downs chain sling grab.

This installation allows one man to move equipment up to the one-ton crane capacity, load, or unload, or set up a job, while others are working. Because the mast has a radial thrust bearing at the top, and the jib bears on two rollers which run on a machined strap on the mast, a child could swing the crane with maximum load. Another feature of the crane is that it is pillar-type set in a 5 x 5 x 6 ft., 6 in. deep concrete block, so that no load is placed on ceiling structural members.

The result of this installation is greatly increased economy. It permits faster, easier handling with greater safety, and, at the same time, saves the expense of man-hours formerly required to move heavy, expensive equipment. As in any job machining operation where micro tolerances, expensive equipment, and highly-skilled men are always required, efficient material handling equipment can make the difference between the breaking-even point and a normal profit.

The crane used was designed, built and installed by the Irving G. King Co.

Jib crane is insert type, 360-deg. rotation.



Rugged Globe Lift-Mobile hoists fork lift onto a level with box cars, then brings truck back to earth.

All level loading speeded by rugged mobile lift platform

A RUGGED MOBILE LIFT is really earning its keep at the C & H Sugar refinery in Crockett, Calif. And because of its versatility and mobility it can perform heavy lifting and loading chores all over the plant and yard . . . jobs that formerly were slow and costly.

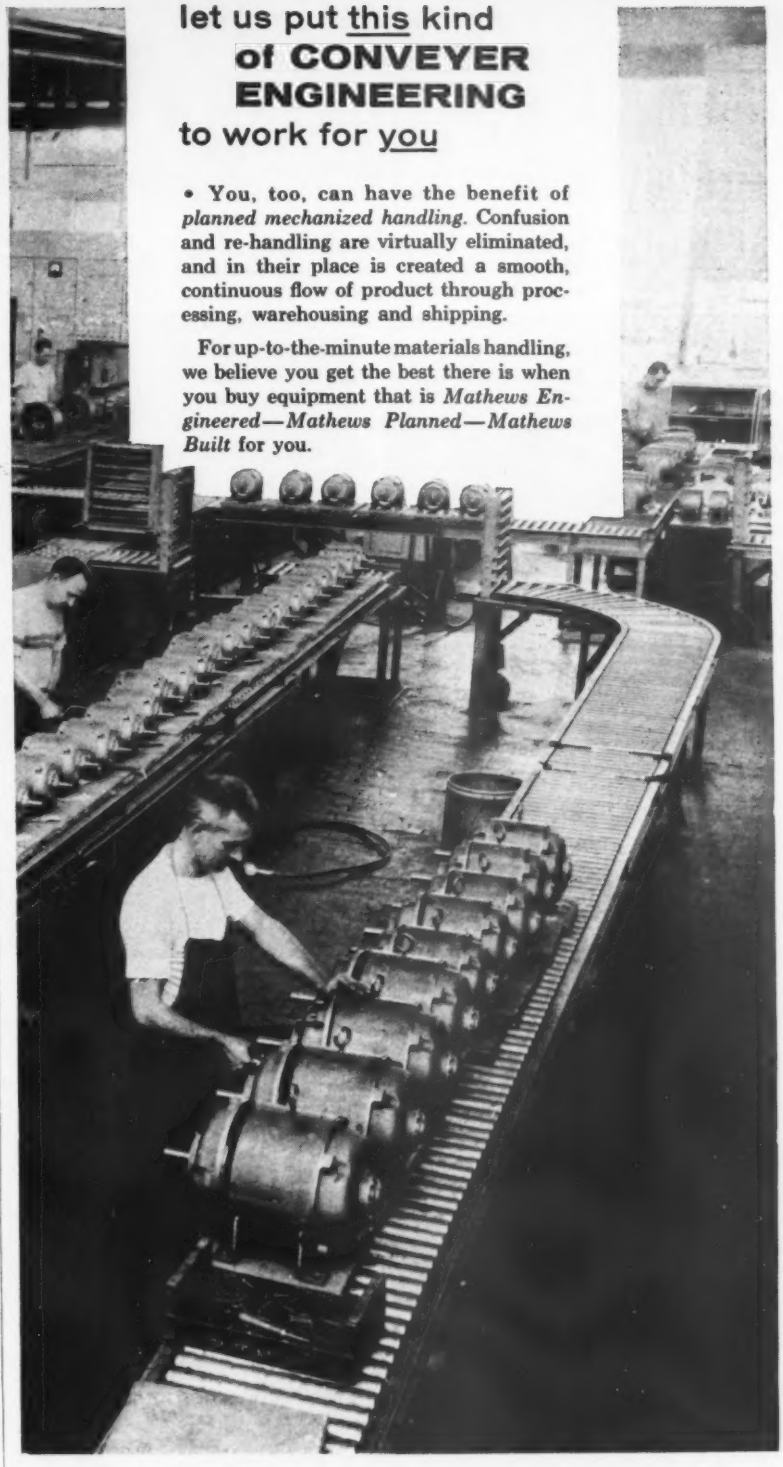
A good illustration of the use of the Globe Lift-Mobile is in the unloading of bags of cornstarch from railroad box cars. A fork lift rolls over the approach ramp onto the deck of the lift platform. Then the platform is elevated by electric motor to the box car floor level. A hinged throw-over bridge plate links the Lift-Mobile platform with the box car.

Then the platform is lowered to ground level and the truck rolls away to its destination. At the end of the rail car unloading job, the Lift-Mobile can be hooked onto the truck and moved quickly to other jobs.

The electric motor which raises and lowers the Lift-Mobile platform through a cable-and-sheave mechanism, gets its power from a handy nearby power source — through a long extension cord. A 25-ft. length of heavy duty cable is reeled out of the lift's starting box and is usually long enough to reach the nearest socket.

In operating position, the two rubber tired wheels are retracted with the box member frame of the lift resting on the floor or ground. For mobility, the wheels are lowered — providing an over-all ground clearance of about 10 ft.

let us put this kind of CONVEYER ENGINEERING to work for you



• You, too, can have the benefit of *planned mechanized handling.* Confusion and re-handling are virtually eliminated, and in their place is created a smooth, continuous flow of product through processing, warehousing and shipping.

For up-to-the-minute materials handling, we believe you get the best there is when you buy equipment that is *Mathews Engineered—Mathews Planned—Mathews Built* for you.

MATHEWS CONVEYER COMPANY WEST COAST
SAN CARLOS, CALIFORNIA
LOS ANGELES · PORTLAND · SEATTLE · DENVER · FORT WORTH
DALLAS · HOUSTON · EL PASO · HONOLULU, T. H. · SALT LAKE CITY

MATHEWS
Over Fifty Years of Leadership in Mechanized Handling

. . . for more details, circle No. 27 on Reader Service Postcard

10 TO 15 NEW JOBS a week, each

a different application, require a continuous program of evaluating the properties of metals and fabricating costs at Robertshaw-Bridgeport.

In making bellows (left) and temperature sensors (above) to meet ever-changing needs of control, appliance, and industrial equipment manufacturers, Bridgeport Thermostat Div., Robertshaw-Fulton Controls Co., Milford, Conn., averages 10 to 15 new problems a week. Specifications vary widely in dimensions and physical characteristics. Dependable performance over long periods of uninterrupted service is vital—yet costs must be rigidly controlled.

So for quality with maximum economy in fabrication, materials must be matched precisely to the needs of each job. And in this, Robertshaw-Bridgeport looks to its suppliers for creative technical services. For many years, The American Brass Company specialists have been helping to select the correct alloys in phosphor bronze or brass and to meet fabrication problems in the making of bellows—to apply economically precision-made capillary tubing and other small-diameter copper tube in sensor assemblies. Through such services, The American Brass Company is constantly helping metal fabricators across the nation control quality while keeping costs down.

ARE you caught between cost reduction and quality control? Find out if you are buying metal properties you don't need. An Anaconda specialist may be able to suggest a lower cost alloy that fits the requirements of your job more closely. Or he may find that an adjustment of temper or a change in your fabrication methods can cut your costs. The services of Anaconda specialists are available through your American Brass representative. Call him in today, or write: The American Brass Company, 14900 Garfield Ave., Paramount, Calif. In Canada: Anaconda American Brass Ltd., New Toronto, Ont.

ANACONDA®

COPPER BRASS BRONZE NICKEL SILVER
MILL PRODUCTS

Made by The American Brass Company

. . . for more details, circle No. 28 on Reader Service Postcard

Best manuals on metals, metallurgy

. . . Sectionalized for easy selection. Yours, free. Use postcard, p. 85 . . .

110-page metallurgical and engineering data book

The data contained in this impressive metallurgical and engineering handbook is su h that the book should be in the hands of all who have anything to do with metals and metallurgy. It covers alloys, formulae, analyses, mechanical properties, comparison tables, specs, dimensions, tolerances, fabrication recommendations, weights and other vital data. **Ducommun Metals & Supply Co.**

. . . for your copy, circle No. 200

Metal miniatures in infinite variety

The trend in industry toward miniaturization, particularly in the electronics field, has led to a tremendous increase in the use of small precision parts which must be manufactured to extremely close tolerances. A good sampling of these are shown in a colorful brochure on eyelets, seamless base bins, screw shells, ferrules, grommets, washers and other fabricated products. There are any number of uses for these in your plant. **American Brass Co.**

. . . for your copy, circle No. 201

Technical data on mill products

Designers, engineers, purchasing agents, production men, metallurgists and others with a bent for metals will find this 12-page technical brochure of value. It gives details on the manufacturer's mill products in aluminum, titanium and other metals. Illustrations and tables tell the story of light and heavy press extrusions, press forgings, hand forgings, impact extrusions, and other wrought mill products. **Harvey Aluminum.**

. . . for your copy, circle No. 202

Behind the scenes at American Silver

As pioneers in the field of custom-rolling of metals to extremely thin gages and high precision tolerances, American Silver presents this leaflet about the company, its services, facilities and products. It gives you a quick glance behind the firm's doors and tells about the strip metal, thin-gage metals and foils, clad metals and thermostat bimetal and components available. **American Silver Co., Inc.**

. . . for your copy, circle No. 203

Summary of Metco metallizing systems

The Metco Metallizing Systems, techniques developed through use of properly treated pure metals which are firmly bonded to a steel base by metallizing, are described in this four-page bulletin. Typical applications of these coatings, that assure oxidization protection for 25 to 50 years and more, are pictured, showing uses on a broad range of equipment and structures. **Metallizing Engineering Co., Inc.**

. . . for your copy, circle No. 204

256-page metals stock list for 1958-59

A more complete metals stock list than this you'll never find. It's a list for every type of metal (steel, aluminum, brass, copper, stainless, in every form (sheets, plates, coils, strip, wire, rods, etc.), for complete cutting and grinding service (shearing slitting, sawing, flame cutting, blanchard grinding). Indexed. **Ducommun Metals & Supply Co.**

. . . for your copy, circle No. 205

Corrosion data on all Haynes alloys

You'll never find a more complete guide to the corrosion resistance of Haynes alloys than this 40-pager which presents data gathered on all corrosives from Acetaldehyde to Zinc sulphate, and the 248 in between. Charts and graphs pack the pages to show penetration rates for each alloy. **Haynes Stellite Co.**

. . . for your copy, circle No. 206

Selection guide for wrought and casting alloys

This book was designed to help you select the proper wrought alloys and casting alloys for your needs, and reports on sheet, plate, foil, wire, rod, bar, tubing and extruded and structural shapes. General helpful information tells about weights, fabricating, finishing. The last page lists available literature and movies for those who want more complete information on aluminum mill products. **Reynolds Metals Co.**

. . . for your copy, circle No. 207

How to fabricate "Hastelloy" alloys

In this 36-page book are step-by-step procedures and recommendations for welding, forging, forming, machining, grinding, brazing, heat-treating, descaling, and pickling four different alloys. Information on lining vessels and corrosion surfacing accompanies the necessary boiler code data, while clear charts and drawings insure you you'll understand the whole process of fabrication. **Haynes Stellite Co.**

. . . for your copy, circle No. 208

Introduction to Silicon Nitride

Resists molten aluminum and other non-ferrous metals . . . resists chemical corrosion . . . retains strength above 2000 deg. F. . . . withstands repeated thermal shock. . . These are just a few of the characteristics of Silicon Nitride given in an eight-page illustrated brochure. Read about typical properties, design considerations, chemical stability and applications to get a more complete picture of this raw material. **Haynes Stellite Co.**

. . . for your copy, circle No. 209

Latest technical information on titanium

This 36-pager is intended as a reference for engineers, metallurgists, and designers who want the latest facts on titanium. Some of the aspects covered include the conversion of the basic ore into sponge . . . melting of sponge into ingot form . . . advantages of titanium . . . rating chart on corrosion properties and characteristics of various titanium alloys. The mill products section covers billets, biscuits and rings, forgings, extrusions, etc. Machining and joining and current and future applications of the metal are included. **Harvey Aluminum.**

. . . for your copy, circle No. 210

Steel . . .

65-page handbook on steel sheet

After reading this, you should be an expert on steel sheet. Photos and clear text take you through sheet rolling . . . steel sheet variety . . . chemical composition of steel for sheets . . . finishing . . . galvanized sheets . . . galvanized formed sheets . . . specialty steel sheets . . . and products made of steel sheet. **Columbia-Geneva Steel Div.**

. . . for your copy, circle No. 211

Memo on galvanized or zinc coated steel sheets

Complete information on product trade names, the producing mills and coating thicknesses on three types of galvanized or zinc coated steel sheets is contained in this memo. The three types are: hot dipped galvanized—continuous process; hot dipped galvanized prepared for painting; electrolyctic galvanized steel sheets. **Ziegler Steel Service Corp.**

. . . for your copy, circle No. 212

Stainless steel—sheets, strip, plates

The 14 pages of this manual gives you a good run-down on all types of stainless steel sheets, strip and plates. Included are chromium-nickel grades . . . grades with superior corrosion resistance . . . stabilized types . . . chromium grades . . . grades with high resistance to oxidation . . . special stainless steel. The fabrication section on page 13 contains many valuable tips on working the sheets, strip and plates. **Armco Steel Corp.** . . . **for your copy, circle No. 213**

All you want to know about steel plates

This handbook includes sections on descriptions of plates . . . miscellaneous plate information . . . common standard specifications . . . grades and qualities . . . chemical requirements . . . manufacturing practices . . . standard tolerance tables . . . weight tables . . . estimating and design information. **Bethlehem Pacific Coast Steel Corp.**
. . . **for your copy, circle No. 214**

How to solve corrosion, heat, abrasion problems

Solutions to problems of corrosion, heat, impact or abrasion in manufacturing processes or end products can mean cost reduction, increased efficiency and often a better product or process. To help you solve these problems is the purpose of this 100-page loose-leaf notebook on alloy and stainless steels for the process and manufacturing industries. It's divided into sections on alloys, casting facilities, engineering and, finally, stainless steels in every form, with supplementary reference tables for a conclusion. **Electric Steel Foundry Co.** . . . **for your copy, circle No. 215**

How to fabricate stainless steels

This chunky fabricator's handbook is designed to solve any problems you might have in the fabricating of rezistal stainless steels. It opens with hints on forming—for instance, when dead-soft annealed, rezistal steels are still half again as hard as carbon steels—and continues with complete data on machining, cutting, joining, heat treating and pickling, to end with finishing. A final 65-page section of reference data in chart form will help you estimate your stainless needs. **Crucible Steel Co. of America.**
. . . **for your copy, circle No. 216**

Background facts on carbon, alloy, steel tubing

Physical and chemical properties, as well as a host of suggested applications, make up this book on carbon, alloy and stainless steel tubing. Accompanying these facts are tolerance charts for seamless steel tubing, and calculated bursting pressure tables. A final section treats carbon, alloy and leaded steel bars. **Pacific Tube Co.**
. . . **for your copy, circle No. 217**

Reference card on high temp steels

You can have high temperature steel and alloy data right at your finger tips with this 3 x 5 plastic coated card. At a glance you'll know the composition of 19 special metals used in high temperature applications, the base material, density, rupture strength at various temperatures and short time properties at room temperature and at 1200 deg. F. Handy? Definitely! **Allegheny Ludlum Steel Corp.**
. . . **for your copy, circle No. 218**

Spotlight on low alloy steel

If you need high yield strength and high tensile strength, but want corrosion resistance and excellent weldability, consider Kaisaloy, a high strength, low alloy spotlighted in a 20-page brochure from Kaiser. The book describes the development of the three grades of this steel and suggests applications for each grade. Mechanical characteristics are detailed and actual applications illustrated. **Kaiser Steel Corp.** . . . **for your copy, circle No. 219**

Data bulletin deals with steel bars

Designated a helpful data bulletin, this 24-page manual deals with improvements in Stressproof steel bars, highlighting advantages of properties which include 100,000 psi. guaranteed minimum yield strength, free machinability, good wear resistance and close tolerances. Other advantages discussed are reduction of material, service and handling costs, as well as elimination of heat treating for many applications. **La Salle Steel Co.**
. . . **for your copy, circle No. 220**

Basic text for users of steel

This 68-page handbook, 5½ x 8 in., is a basic text for personnel engaged in manufacture, selling and uses of steel. It deals with production, uses and history of cold finished steel bars. Single copies of this publication are $1.00; discounts on quantity orders. For your copy write to **Sierra Drawn Steel Corp.**, 5821 E. Randolph St., Los Angeles 22, Calif. . . . **for your copy, circle No. 221**

Info on electric welded steel tubing

This information sheet on tolerances, specifications and ordering data for electric welded steel tubing is so handy it should be on every plant bulletin board. It covers at a glance mechanical properties, cutting allowance, oiling, claims, packaging, and fabricated tolerances. The final page answers questions on tube fabrication. **Bernard Epps & Co.**
. . . **for your copy, circle No. 222**

Three data books on tool steels

That versatile metal, tool steel, comes up for its proper share of attention in three booklets from Crucible. Tool steels for the die casting process, for the hot extrusion process and for forging operations are all spotlighted with each process pictured and accompanied by explanatory text. All books conclude with tabular data and some general pertinent observations. **Crucible Steel Co. of America.**
. . . **for your copy, circle No. 223**

The story of lead treated steels

The remarkable machining characteristics of lead treated carbon and alloy steels result from the lubricating effect of carefully controlled additions of lead. It's added in the form of fine pellets, literally sprayed into the steel. These and other interesting facts about lead treated steels are revealed in this book, along with their other advantages and characteristics. One section tells how leaded steel is worked, another summarizes investigations of fatigue characteristics. Product notes are included. **Aristoloy Steel Div., Copperweld Steel Co.** . . . **for your copy, circle No. 224**

Vest pocket steel data book

This 3 x 5 60-pager is a quick-fact data book on flat ground steel of the oil hardening, air hardening and low carbon types. In it are listed 1001 sizes for 1001 uses as well as physical properties, and a weight calculating table. The decimal equivalent chart at the end is handy too. **Simmonds Saw & Steel Co.** . . . **for your copy, circle No. 225**

240-page, pocket-size book of steel products

Sized, tabbed and indexed for frequent, easy use, this 240-page stock list and reference book contains data on practically every type of steel used today, including sizes in stock and necessary weights, dimensions and descriptive data. It covers carbon, alloy and stainless steels available for immediate shipment. Useful data tables contain weights of various steel shapes, mechanical properties, standard steel compositions, standard sheet gages and weights and cold finished bar manufacturing tolerances. **Joseph T. Ryerson & Son, Inc.** . . . **for your copy, circle No. 226**

Layman's book on stainless castings

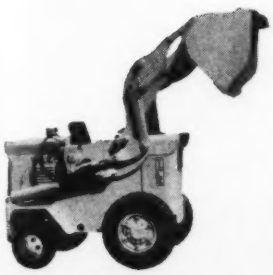
This little book is one of a series designed to acquaint you with important phases of the high alloy industry and to remind you of some fundamentals that must be considered when specifying alloy steel castings. It is a research paper on the development of .03 maximum carbon stainless steel castings which tells you why they were developed, how they are used, how they are made and presents the results of some tests with the castings. **Electric Steel Foundry Co.**
. . . **for your copy, circle No. 227**

40 pages on two types of aluminized steel

Two books—20 pages each—give all facts on two types of aluminized steel. Type 1 is used for its economical resistance to a combination of heat and corrosion. Type 2 offers excellent atmospheric corrosion resistance. Both types are thoroughly described, along with advantages, available sizes, fabrication and finishing specifications, etc. Many large photos help put over points quickly and effectively. **Armco Steel Corp.** . . . **for your copy, circle No. 228**

10 hours' work in an 8-hour shift!

That's the production advantage of the Yale Industrial Tractor Shovel



Here are the features that make the Yale Industrial Tractor Shovel outstanding...

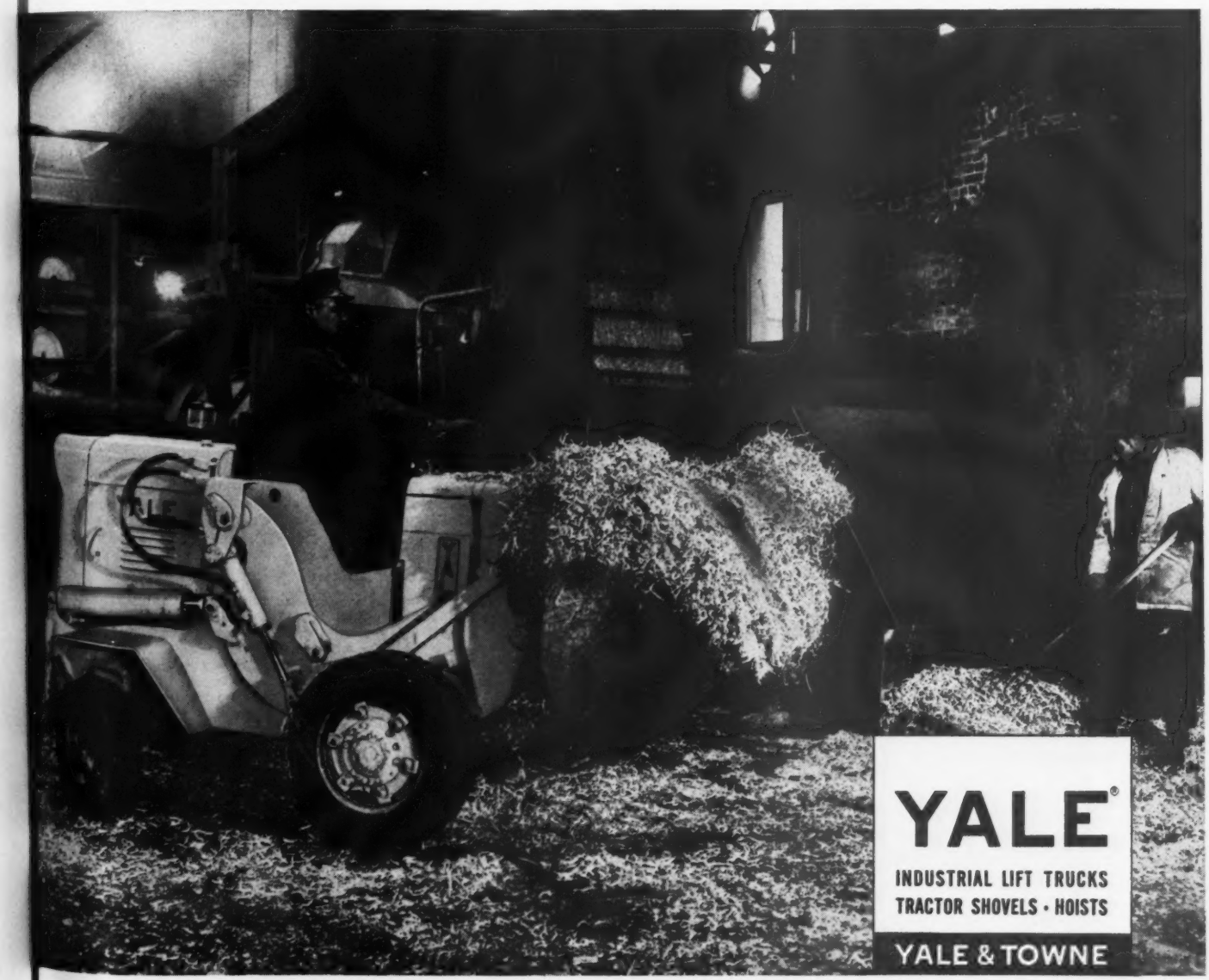
PRECISELY CONTROLLED HORSEPOWER! 72 hp. 6 cylinder engine provides smooth power through matched torque converter and Yale torque transmission (fully automatic). One speed in both directions. Inching control permits delicate close-quarter maneuvering. Extra punch for impact loading. Accelerates to 13 mph. in 5½ seconds.

PERFORMANCE! 2500 lb. carry capacity. Exclusive 45° bucket tipback permits faster loading and lowest carry position for faster transport with minimum spillage. 6' dumping clearance permits dumping into bins and hoppers out of range of other—even larger—tractor shovels. Shortest turning radius, too—only 73".

SAFETY! Safety-curve lifting mechanism members never rise alongside the operator. Front and back working lights provide extra security.

DEPENDABILITY! Rugged design • sealed brakes and electrical system • protected steering linkage • 10 ply tires—all adds up to more work at less cost...more production hours. Full range of buckets and attachments available.

Field applications prove that these features add up to 25% more work per hour—10 hours' work in an 8-hour shift. For a demonstration in your plant or complete information contact your Yale representative. Or write The Yale & Towne Manufacturing Company, Yale Materials Handling Division, Dept. YT 2-H.



Yale Materials Handling Division, a division of The Yale & Towne Manufacturing Company. **Manufacturing Plants:** Philadelphia, Pa., San Leandro, Calif., Forrest City, Ark. **Products:** Gasoline, Electric, Diesel and LP-Gas Industrial Lift Trucks • Worksavers • Warehousers • Hand Trucks • Industrial Tractor Shovels • Hand, Air and Electric Hoists

. . . for more details, circle No. 29 on Reader Service Postcard

50-page handbook on steel plate

Here's a handsome, hardbound handbook with steel spiral binding that allows all pages to lie flat. The book explains all phases of steel plate. Sections include: basic steel making . . . what is steel plate . . . plate processing . . . specifications . . . chemical ranges and limits of plates . . . how and where carbon plates are used . . . typical applications of carbon steel plates . . . special steel plates. Pictures, charts and graphs help put over the story so everyone can understand it. **Columbia-Geneva Div., United States Steel Co.**

. . . for your copy, circle No. 229

Indexed notebook on steel structural sections

The index in this 80-page loose-leaf notebook will lead you to data on a variety of hot rolled carbon steel structural shapes, such as zees, bulbs, tees, angles, piling. You'll also find theoretical dimensions and properties for detailing for all the structural sections. **Bethlehem Pacific Coast Steel Corp.** **. . . for your copy, circle No. 230**

74-page catalog of steel wire products

In this 74-page, spiral-bound wire catalog you'll find the complete, step-by-step story of how steel is made and rolled into rod ready for wire drawing. These operations are told with words and pictures in 16 pages, while a similar explanation of "cold operations" covers another six. Other sections list all kinds of wire—flat and shaped, low carbon coarse, high carbon and low carbon fine and specialty wires. Testing, packaging, and shipping data and an 11-page glossary are included. **Colorado Fuel & Iron Corp., Wickwire Spencer Steel Div. . . . for your copy, circle No. 231**

A steel for the screw machine industry

This free-machining steel was developed especially for the automatic screw machine industry and the story of its development and use is an interesting one. You'll find it in a six-page brochure along with results of a number of shop production tests in which the steel was used. **Kaiser Steel Corp.** **. . . for your copy, circle No. 232**

Data composite on Sagamore-EZ

What is Sagamore-EZ? It's a 5% chromium air hardening die steel with uniformly distributed sulfide particles for improved machining characteristics. What's it for? The steel is applicable to blanking and forming punches, dies and tools, trimmer dies, plastic molding dies, and gages. More questions? See this leaflet for facts on forging, annealing, hardening, tempering. **Allegheny Ludlum Steel Corp.**

. . . for your copy, circle No. 233

Meet A. W. Algrip, an abrasive floor plate

A. W. Algrip is an abrasive rolled steel floor plate. He has the distinction of being the only one of his kind. He's patented, too. You'll be smart (and safer) to flip through this leaflet for application ideas for your own plant and to check on fabricating data. There's never a slip with Mr. Algrip. **Alan Wood Steel Co.**

. . . for your copy, circle No. 234

Aluminum . . .

Aluminum alloy four-digit designation system

Here's a handy reference folder that spells out the four-digit and temper designation, both old and new, of aluminum alloy. Table #1 sets down designation for alloy groups and table #2 gives aluminum alloy designation conversions. Also thoroughly explained is the temper designation system. The digit system is completely explained and examples are given every step of the way. **Ziegler Steel Service Corp.**

. . . for your copy, circle No. 235

Hollow aluminum stock fills the bill

Cost cutting aluminum hollow bar stock is available in all machining alloys for any hollow parts job. An eight-page stock brochure of round and hexagonal hollow standard sizes available gives the wall thicknesses, dimensions and weight per foot. The clear, handbook points out some of the advantages of hollow over solid stock and gives tolerances, alloys, mechanical properties and specifications of the hollow machining material as well. **Harvey Aluminum.**

. . . for your copy, circle No. 236

Don't overlook aluminum sheet

Aluminum alloy sheet and plate are outstanding materials for applications requiring a ductile, light, non-rusting metal. On the chance that you're overlooking it in your plant, here's a brief leaflet full of ideas for you. In addition to application data, you'll find extensive charts which serve as a wrought alloy selection guide. **Reynolds Metals Co.**

. . . for your copy, circle No. 237

Where, when, why and how with aluminum

A series of 27 informative articles gives practical answers to design engineers' questions regarding the application of aluminum in this booklet. Photographs, charts and tables help the designer find where aluminum's light weight and strength, corrosion resistance and high conductivity can best be utilized. Such problems as "roll forming vs. extruding" are debated. One article, for example, will aid you in "redesigning from steel to aluminum sheet." **Kaiser Aluminum & Chemical Sales, Inc.** **. . . for your copy, circle No. 238**

Source for aluminum, magnesium castings

American Brake Shoe is a new source for aluminum and magnesium castings for aircraft, missiles and electronics. This brochure introduces the firm's products and facilities (sand, permanent mold, plaster) for your inspection. A handy chart on the mechanical properties of aluminum alloys is included. **American Brake Shoe Co.**

. . . for your copy, circle No. 239

Forging ahead with aluminum

The forging of aluminum has been changing rapidly from a blacksmith's craft to one of the most intricate of production processes. And with this change has come a completely new class of precision forgings. For a look at these turn through this 36-page picture book; you'll see aluminum and magnesium forgings for use in almost every industry and at the same time learn about the services and facilities of Alcoa's plants. **Aluminum Co. of America.**

. . . for your copy, circle No. 240

Applications for aluminum products

The use of aluminum has expanded so rapidly in recent years that it now holds the No. 1 spot in the non-ferrous field, second only to iron and steel in both tonnage and volume. New aplications for aluminum are constantly being found and the end is nowhere in sight. Here in a 38-page book are just a few of the thousands of applications for aluminum products, accompanied by engineering data on heat-treatable and non-heat-treatable alloys, and extensive product listings. **Revere Copper & Brass, Inc.**

. . . for your copy, circle No. 241

Complete current aluminum price list

Here's a 36-page price list in chart form for aluminum round, hexagon, square, rectangular and plate products. With this list you can find the current price of any given quantity of any given product in just seconds. **Turner Metals Supply Co.** **. . . for your copy, circle No. 242**

Tabular listing of available mill products

The tabular form of this 24-page booklet on aluminum mill products makes it quick and easy to select types of sheet, plate, foil, rod, bar, wire, extrusions, tubing forgings, billet or pig. Two tables compare the non-heat-treatable and heat-treatable wrought alloys by describing applications, chemical composition, available form and tensile, mechanical and physical properties of each alloy and temper. **Kaiser Aluminum Chemical Sales, Inc.**

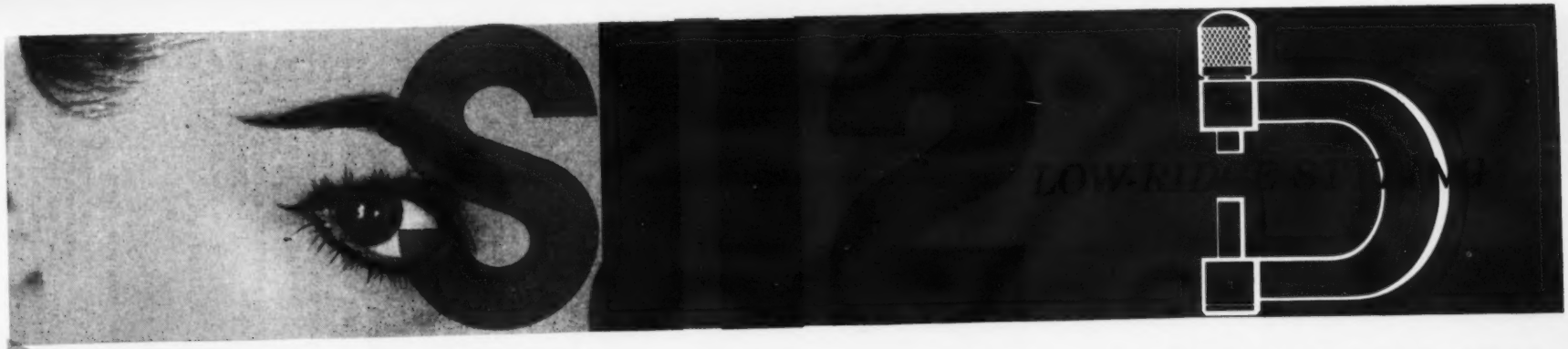
. . . for your copy, circle No. 243

Brass . . .

Availability of superfine drawing brass

If you're making products on which finishing is an important cost factor, send for this eight-page leaflet on a superfine grain drawing brass called Formbrite. It is said to be stronger, harder and springier than the usual drawing brasses in the same standard tempers, yet retains a good ductility for forming and drawing and take sharp ornamental die impressions. Five case studies include help to prove the manufacturer's claims. **American Brass Co.**

. . . for your copy, circle No. 244



BOLD NEW BUILDING SPACE CONCEPT

Wall to wall, floor to ceiling, here's more usable building area than you've *ever* known! Clear, bright, uncluttered area for manufacturing, selling or serving. Vast free spans to 120′ make space allocation easy and effective. Lengths in multiples of 20 feet or to meet your exact needs. Eave heights, 10 to 20′. Favorable Soulé financing plan now available.

Inquire now about new Low-Cost Series 112 Soulé Buildings.

Soulé

LEADER IN STEEL BUILDINGS

SOULE' STEEL COMPANY

San Francisco
Los Angeles
San Diego
Portland
Seattle
Spokane
Phoenix
Salt Lake City

New high-fashion Series 112 Soulé Buildings adapt at low-cost to meet your styling needs.

5402

. . . for more details, circle No. 30 on Reader Service Postcard

Duplex tubes to solve industrial corrosion problems

You can find an application of these duplex tubes—consisting of an inner and outer tube of different metals—which resist corrosion. Actual installations are pictured and described in these applications: refining . . . chemical processing . . . food processing . . . heat transfer . . . Steam generation . . . and many others. The many-paged design and installation section show you how these tubes can be installed in your plant. And the questionnaire enclosed with the book will aid you in selecting condenser and heat exchange tubes. **Bridgeport Brass Co.**

. . . for your copy, circle No. 245

Metalexicon will find the right word for you

If the right word escapes you and the word is about metals, this 20-page Metalexicon will prove invaluable. The terms and definitions—some 500-600 of them—apply to brass mill products. Several of the terms—such as angle, different types of coil, crown, longitudinal curl, various tubes, and others—are illustrated for further clarity. The booklet also has three tables for product classification. **The American Brass Co.**

. . . for your copy, circle No. 246

Copper . . .

Research results on corrosion and copper

Results of laboratory research and field study about corrosive attack on copper and copper alloys are incorporated in the first section of this 32-page reference work. A revision of the 1953 edition, it includes a tabulation to indicate the relative corrosion resistance of the principal types of copper and copper base alloys when in contact with 196 different corroding agents. Other sections deal with typical industrial uses of these metals, and a complete listing of Anaconda alloys and welding rods. **The American Brass Co.**

. . . for your copy, circle No. 247

A heritage from Paul Revere

Since the first American copper rolling mill was established by Paul Revere in 1801, a lot of knowledge has been accumulated about copper and its alloys. This 50-page booklet furnishes you with the cream of this knowledge about coppers, brasses, bronze alloys, nickel alloys and welding techniques. A condensed product listing furnishes a conclusion. **Revere Copper & Brass, Inc.**

. . . for your copy, circle No. 248

List of Anaconda metal products

Here's a complete listing of Anaconda's metal products and complete data on same. A glance will show you copper, and copper alloys that can be manufactured in sheets, plates, strips, wire, rods, bars, tubes or extruded, rolled and drawn into special shapes and die pressed forgings. **American Brass Co.**

. . . for your copy, circle No. 249

Bronze . . .

An introduction to Phosnic bronze

Phosnic bronze, a high copper alloy combines high strength and high conductivity, both electrical and thermal, in an unusual degree, is spotlighted in an introductory bulletin. The book is laid out to answer your question in the order in which they'll probably occur: what is Phosnic? What about strength, resistance, stress-strain, conductivity, corrosion resistance? Book includes four pages of properties charts. **Chase Brass & Copper Co.**

. . . for your copy, circle No. 250

10 standard phosphor bronze alloys

Plates, sheets, strips, rods, bars, wire and seamless tubes are the forms in which you'll find this superfine-grain phosphor bronze. If you need these products consider this material, for it has high strength, excellent ductility, resiliency and high resistance to fatigue, abrasion and corrosion. A four-pager pictures parts available and uses micrographs to illustrate textures. **American Brass Co.**

. . . for your copy, circle No. 251

Centrifugal casting of bronze and copper

Centrifugal force is a natural law of physics. When it is applied as a casting technique it provides castings with improved physical characteristics, high density, strength and ductility. If in doubt check this leaflet on National Bearing's facilities for centrifugal casting of bronze and copper, see some typical products and then find out how you can take advantage of this method. **National Bearing Div., American Brake Shoe Co.**

. . . for your copy, circle No. 252

50 pages on cast and sintered oil-filled bronze

Complete specifications on cast bronze (standard stock bearings, precision bronze bars, graphite oilless bearings) and sintered oil-filled bronze (plain bearings, flange bearings, thrust bearings, bars) are included in this 50-page data book. All told there must be over a thousand different shapes and sizes to choose from. A section is included on powdered metallurgy. **The Bunting Brass and Bronze Co.**

. . . for your copy, circle No. 253

Iron . . .

Cold drawn wrought iron tubing

The success of any tubing material depends on its ability to prove itself economical on an annual cost basis. Tubing used in heat transfer equipment, such as condensers, heat exchangers, air preheaters and economizers has always been a source of continual maintenance and replacement. Test data in this book, however, shows that wrought iron tubing minimizes these problems by providing longer service at lower cost per year. Actual installations are cited in which both wrought iron and other metal tubing were used and cost-per-foot-per-year figures are listed for each material. A table of wrought iron tubing sizes, calculated weights, internal and external working pressures and tolerances concludes the book. **A. M. Byers Co.**

. . . for your copy, circle No. 254

Wrought iron for drainage systems

A sound building drainage system is a problem which we all face at least once, and sometimes more often. When the problem presents itself, remember this 62-page book on wrought iron pipe designed especially for building drainage systems. The book covers all the characteristics of wrought iron, corrosive conditions in drainage, briefs different drainage systems, presents building piping surveys with pictures and generally supplies you with data necessary before tackling the problem of a good drainage system. **A. M. Byers Co.**

. . . for your copy, circle No. 255

Controlled specification cast irons

For "quality under the skin" you should read this brochure. Actual photos probe into the grain structure of the castings produced by controlled specification cast irons. The brochure shows how controlled grain structure equals controlled density and strength. A complete chart list mechanical and physical properties of sorbo-mat irons. The results are superior mechanical properties in strength, density, structure, machinability. **Dayton Foundry.**

. . . for your copy, circle No. 256

Properties, applications of ductile irons

A roundup of the best facts on engineering properties and applications of ductile irons is presented in this 28-pager. Pictures and short text explain these points: ductility . . . castability . . . wear-resistance . . . heat resistance . . . machinability . . . toughness . . . strength and rigidity . . . hardenability. Easy to read charts point out: types of ductile iron . . . typical applications . . . special properties of ductile iron. **Dayton Foundry.**

. . . for your copy, circle No. 257

Machining . . .

Specs index for screw machine shops

Invaluable for screw machine shops, this 8 x 11 fold-out spec index lists trade and government specifications met by Chase copper and copper alloy rod, bar and shapes. It also gives nominal compositions and machinability ratings. Tack it on your wall to keep handy. **Chase Brass & Copper Co.**

. . . for your copy, circle No. 258

. . . for more details, adv. opp. pg., circle No. 31 on Reader Service Postcard →

CHANGE LIGHTING FIXTURES AS OFTEN AS YOU WISH WITHOUT COSTLY REWIRING

Modern BullDog 20-amp Universal Lighting Duct permits fixture modernization at substantial savings over pipe and wire systems.

You know what an expense it is to install new lighting fixtures, especially when you're saddled with a pipe and wire electrical system. Extensive and *expensive* rewiring is just the beginning. There are fixture locations to plan, new hangers to install . . . and usually long production shutdowns. Waste is great, too, since old wiring can never be reused.

It's just the opposite with 20-amp Universal Lighting Duct. The system is exceptionally easy to install—both feeds and supports lighting fixtures. Twist-in plugs attached to each fixture let you tap into power in seconds. No costly rewiring. No production shutdowns. The entire system can even be relocated without loss if the need ever arises.

Further, since fixtures can be positioned at any spot along the duct, you can reposition them or add new ones whenever desired. In short, ULD will suit your lighting needs *exactly*, now and in the years to come.

When you modernize your lighting, modernize with BullDog Universal Lighting Duct. It is, *by far*, the most flexible and economical lighting system ever devised. © BEPCO

BULLDOG ELECTRIC PRODUCTS DIVISION
I-T-E CIRCUIT BREAKER COMPANY
BOX 177 • DETROIT 32, MICHIGAN

In Canada: 80 Clayson Rd., Toronto 15, Ont. Export Division: 13 East 40th St., New York 16, N.Y.

Consult the following Pacific Coast representatives:

Coast Electric & Manufacturing Co.
1733 N. E. Seventh Ave., P. O. Box 7712
Portland 12, Oregon

Young Electric & Mfg. Co.
2134 Curtis St.
Denver 2, Colorado

Safety Switchboard Company
910-89th Avenue
Oakland 21, California

BullDog Elec. Prod. Co. of Los Angeles
2885 E. Washington Blvd.
Los Angeles 23, California

37 pages on machining of stainless steel

This how-to-do-it manual gives all necessary instructions and tips on machining stainless steel. Grades of stainless steel are set down, with facts on composition and characteristics. Then a chart shows cutting rates for each type. Operating instructions for all types of cutting, boring, broaching, grinding tools follow . . . climaxed with a tool materials and selection chart. There's a page on cutting fluids . . . a handy section on tabular data . . . and a windup with finishes and tolerances. **Armco Steel Co.**

. . . for your copy, circle No. 259

Extensive aluminum machining data

A dozen pages of tabular material provide you with all the aluminum machining data you'll need in many a month. Here you'll find out about speeds and feeds, skiving, forming, turning, box milling, cutting, calculating cutting speeds, boring, drilling, when to use a center or spot drill and anything else connected with aluminum machining. **Reynolds Metals Co.** **. . . for your copy, circle No. 260**

How to machine aluminum alloys

In addition to being a "how to" guide to machining aluminum alloys, this 125-page book is an evaluation of the relative merits of the various aluminum alloys and a recommendation for those machining methods and tools that will enable you to get maximum production economy. See "Points to Remember," page 9, for a quick overall picture of the principal factors involved in machining, and Section One, page 11, for a compact chart form recommendation on tooling, speeds and feeds, turning, milling, shaping, and so on. Section Two is general information on various phases of machining. **Turner Metals Supply Co.**

. . . for your copy, circle No. 261

50 pages on carbide blanks, tools

One hundred years of experience is back of the inserts, toolholders, blanks, brazed single point tools, cutters and scrapers treated in this catalog. They're presented in the quickest and easiest way possible—pictures, diagrams and tabulations. The book's final section on technical data reviews such things as physical characteristics, cutting speeds, face milling, horsepower and conversions. **Sandvik Steel, Inc.**

. . . for your copy, circle No. 262

Cemented carbides for industry-wide use

Almost as hard as a diamond, but far tougher—that's cemented tungsten carbide, a cutting and forming tool material for general industrial use. Find out more about it and its use in this 30-pager on brazed tools, inserts, tool holders and blanks. General information on grades, grade comparisons, speed and feed, and ordering rounds out the book. **Carmet Div., Allegheny Ludlum Steel Corp.**

. . . for your copy, circle No. 263

Eight pages of stainless steel machining data

This eight-page bulletin tabulates feeds, machining speeds and grades of carbide cutting edges best suited for roughing, semi-finishing and fine finishing 188 compositions of stainless steel types from 201 to 502. Austenitic, ferritic and martensitic stainless steels are discussed briefly, as are tool geometry and coolants. The firm's diagrammetic method of matching grades with machining conditions is also featured. **Kennametal Inc.** **. . . for your copy, circle No. 264**

Welding . . .

Resume of the resistance welding process

Seventy years ago the resistance welding process was discovered by accident. Today it is known as the fastest, most economical method of joining metals. Much of this advance in resistance welding has been due to the development of suitable copper-base alloys to meet the need for high conductivity, wear resistance, high proportional limit and raised annealing temperatures. This book demonstrates electrodes and high conductivity alloys for the resistance welding process, touching on dies, adaptors, quick disconnect shutoff couplings, seam welder shafts and bushings. **Ampco Metal, Inc.** **. . . for your copy, circle No. 265**

Speed production welding of commercial metals

This manual Sigma welder can be used on practically all commercial metals to cut production costs by reducing both the actual welding time and the time required for slag and spatter removal. It's definitely worth considering for your plant. Here you'll find the advantages defined and special features such as automatic operation, flexibility, wide work range, listed and illustrated. Additional equipment, accessories and supplies can make the welder installation tailormade, a definite advantage. **Linde Co. Div. Union Carbide.**

. . . for your copy, circle No. 266

Explanation of welding processes

If you're hazy on the subject here's a book that will answer your questions on the various welding processes as well as recommended welding currents and proper techniques. Ampco's complete stock of bronze electrodes, filler rod and wire is briefed, too. The final page is a bronze electrode and filler rod selection and preheat chart, which you could tear off and post for quick reference. **Ampco Metal, Inc.** **. . . for your copy, circle No. 267**

Complete guide to silver brazing

In this pocket-sized, 50-page handbook you'll find all facts necessary to successful silver brazing. Contents include: brazing process . . . silver brazing alloys . . . nominal compositions of silver brazing alloys . . . silver brazing fluxes . . . base metals and problems related to silver brazing . . . chart for selection of silvaloy . . . joint design . . . advantages of silvaloy "preforms" . . . preparation for brazing . . . the brazing process . . . cleaning . . . inspection . . . thermal expansion of metals . . . specification check list . . . physical properties of metals . . . brazing alloy quantities by weight . . . conversion chart. **Engelhard Industries, Inc.**

. . . for your copy, circle No. 268

Modern methods for joining metals

Welding is truly a modern method for joining metals. And regardless of metal composition, thickness, shape and contour, there's a welding method for joining any metal part. This 32-page book demonstrates many ways in which metal parts are joined by welding processes and we'll wager it will give you some new ideas that you can use in your own plant. Beautifully illustrated with large clear pictures. **Linde Co., Div. of Union Carbide Corp.**

. . . for your copy, circle No. 269

Miscellaneous . . .

Two on powdered metal parts production

"Extremely fine powders such as copper, iron, tin, lead, nickel and zinc are thoroughly blended to produce the required properties of the finished alloy. The die cavity is filled with the powder mixture which is then compacted under very high pressure. After the sinterings have been compressed and ejected from the die, they have merely sufficient 'green strength' for handling." This is just the first part of a process that you'll find detailed in these two leaflets on the products of powder metallurgy. Much material is also in tabular form for quick reference. **Asco Sintering Corp.** **. . . for your copy, circle No. 270**

How to trim pounds off your product

If you're in a hurry to reduce the weight of a product, check this 16-page brochure outlining the most recent developments in metal weight control. The attractive publication reports on weight control through high strength, availability of huge plates and close tolerances. Production economies through stress relieving and precision forgings and castings also get attention. **Aluminum Co. of America.**

. . . for your copy, circle No. 271

Metal-ceramics for high-temperature service

If you use furnace muffles, flame guardian rods, jet flame holders, thermocouple protection tubes, or molten metal control pins, for instance, look into this booklet on metal-ceramics, that new material that shows such definite promise in the area of high-temperature service. Within these 12 pages are the physical, mechanical and chemical properties as well as typical applications for these new cermets, now in use to temperatures of 2800 deg. F. **Haynes Stellite Co.** **. . . for your copy, circle No. 272**

. . . for more details, adv. opp. pg., circle No. 32 on Reader Service Postcard →

NO TROUBLE CALLS WITH PUSHMATIC . . .

bolted connections are standard on every breaker

Ever hear of "nuisance tripping" in circuit breakers? It occurs regularly in many plants — boosting maintenance, hampering production, costing plenty. But not when Pushmatic® is on the scene. Here is a circuit breaker that thinks for itself — that puts an end to trouble calls. And here's why...

Unlike plug-in type breakers, a Pushmatic *bolts* to a bus bar, cannot work loose and cause excessive heating. It provides a high-pressure, low-resistant, *positive* connection always.

No complicated installation either. It can be installed simply and quickly by merely tightening a captive screw onto the bus bar.

Other Pushmatic plusses: Pushbutton convenience and control . . . quality you can depend on. More than a dozen individual tests are given each and every Pushmatic before packaging. The result is *proved* performance *every* time. Get Pushmatic and end trouble calls. © BEPCO

BULLDOG ELECTRIC PRODUCTS DIVISION
I-T-E CIRCUIT BREAKER COMPANY
BOX 177 • DETROIT 32, MICHIGAN

In Canada: 80 Clayson Rd., Toronto 15, Ont. Export Division: 13 East 40th St., New York 16, N.Y.

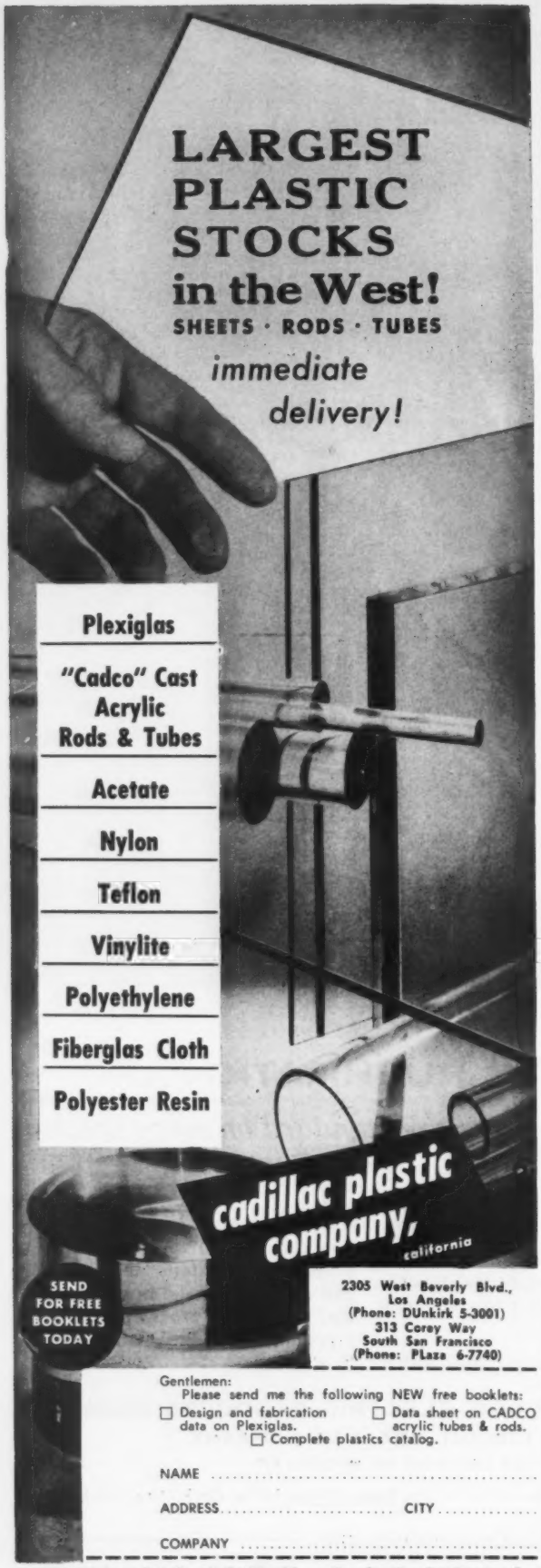
Consult the following Pacific Coast representatives:

Coast Electric & Manufacturing Co.
1733 N. E. Seventh Ave., P. O. Box 7712
Portland 12, Oregon

Young Electric & Mfg. Co.
2134 Curtis St.
Denver 2, Colorado

Safety Switchboard Company
910-89th Avenue
Oakland 21, California

BullDog Elec. Prod. Co. of Los Angeles
2885 E. Washington Blvd.
Los Angeles 23, California



. . . for more details, circle No. 33 on Reader Service Postcard

Lots of muscle, little fat

You can save 44% in weight with no loss in strength if you replace conventional stainless steel fittings with those of titanium in high pressure high temperature applications. This illustrated brochure discusses the properties of forged titanium fittings, and outlines some of the applications and advantages of this strong featherweight metal. **Harvey Aluminum.**

. . . for your copy, circle No. 273

Numerically controlled contour milling machines

Here's a "new era in contour machining" . . . which describes a new method that effects major reductions in lead time and costs—even on one-of-a-kind jobs. Sections include: how numerically controlled contour machining works . . . simplified programming techniques . . . control features . . . taking advantage of tape control accuracy . . . basic working ranges of numerically controlled contour milling machines. **Giddings & Lewis Machine Tool Co.**

. . . for your copy, circle No. 274

Facts on extruded cold-heading wire

Charts, pictures and brief text cover 23 extruded copper alloy wires for cold-heating operations, coining or embossing, heading and extruding, heading and drillings and other operations required of wire. You'll find composition, tensile strength, specs, machinability, electrical conductivity and weight data. In short, all you'll need to know on the subject. **Chase Brass & Copper Co.**

. . . for your copy, circle No. 275

How to use hack and band saws

For cutting metal, that is. If properly used the hack saw is an inexpensive yet efficient method of cutting almost all ferrous and non-ferrous materials. This 32-page pocket-sized book shows you the proper uses, at the same time filling you in on hand and power blades. A second similar book talks about the care and use of metal cutting band saws, proper blade selection and tooth shapes. **Simonds Saw & Steel Co.**

. . . for your copy, circle No. 276

Practical guide to investment casting

This 44-pager is sectionalized under these headings: Typical applications by industries . . . Specification of standard cast alloys . . . Design information . . . Manufacturing procedures . . . Pictures, charts, and diagrams tell the bulk of the story. For instance, every part is pictured and described. Then charts give you complete specifications on standard cast alloys. Everything else is spelled out in easy-to-grasp, easy-to-use form. **Arwood Precision Casting Corp.**

. . . for your copy, circle No. 277

A story of pipe and tubing

Are you an engineer who wants technical information in a hurry (who doesn't)? Or a new tubing user who wants the full story on stainless and high alloys? Or perhaps an old tubing user who wants to know "Why welded tubing?" This book, then, is for you. Its 50 pages tell the story of stainless steel and high alloy pipe and tubing, answering all questions for the novice user and veteran alike and winding up with a group of very valuable tables. **Trent Tube Co.**

. . . for your copy, circle No. 278

A new dimension in corrosion control

Four-D wrought iron, 25% more corrosion resistant than standard wrought iron, is Byers' latest product development. Meet it in this colorful brochure, see actual installations and applications and study the data comparing service life of wrought iron and other materials under identical environments. Then see if you can use it in your own plant. **A. M. Byers Co.**

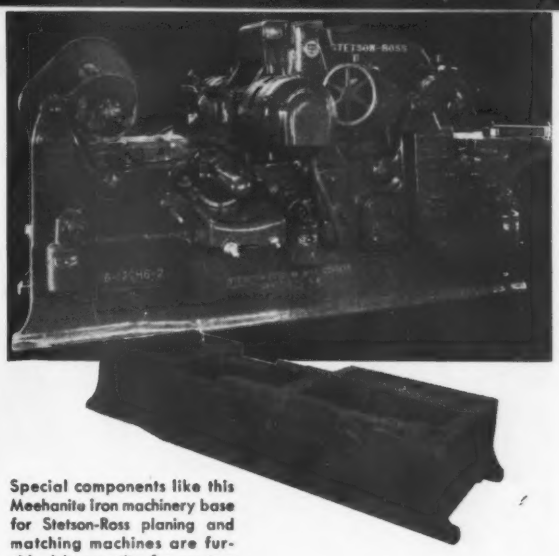
. . . for your copy, circle No. 279

A guide to better fastening

Here's a guide to the proper use of spring lock washers in parts fastened with screws or bolts and nuts. By describing the functions of a washer in a bolted assembly and citing some examples of good practice it shows the underlying principles of fastener selection. A series of curves show the spring lock washer in action as dimensional changes occur between bearing surfaces from wear, corrosion, thread creep, gasket set, and so on. **Reliance Div., Eaton Mfg. Co.**

. . . for your copy, circle No. 280

Complete machines are our specialty. This tilting vacuum work table, engineered in conjunction with Boeing Airplane Co. for a tape-controlled skin mill, expedites wing panel milling by vacuum chucking.



Special components like this Meehanite iron machinery base for Stetson-Ross planing and matching machines are furnished in quantity for western manufacturers.

"Custom-built" by Washington...

complete machinery and equipment units and large-scale components—special castings, weldments and fabrications

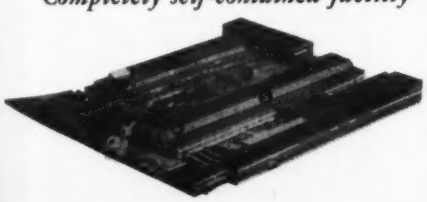
A list of specialized Washington-built products could begin with such items as "kort nozzles," "explosion dies," "garbage truck bodies," "vacuum work tables," "suction dredge rotor blades" and go on until it covered many industrial applications. Included would be aircraft manufacture, atomic energy projects, shipyards and shipbuilding. construction, mining, logging, transportation, pulp and paper, plywood and board, chemical and petroleum plants, machinery manufacturers and many others.

In some cases the jobs involved manufacture of large or complex castings, weldments, forgings or fabrications from specifications furnished. Others were only "ideas" to be refined, designed, engineered and manufactured to answer a particular need for a machinery component, complete machine or even an entire production line.

In more than seventy-five years of experience is the engineering and manufacturing know-how to save you time and money in solving your special machinery or equipment problems. *Write for an eight page brochure detailing the services and facilities of Washington Iron Works. Let us submit quotations or estimates from your specifications.*

Naturally, Washington Iron Works' own machinery and equipment, including all component parts, design and engineering, as exemplified by this cylinder casting and completed hot plate press, is produced within the one plant.

Completely self-contained facility



1 Main office, engineering
2 Fabricating shop
3 Forge and heat treating
4 Steel erection
5 Machine shop
6 Assembly and testing
7 Pattern shop
8 Foundry heat treating, finishing
9 Iron and steel foundry
10 Pattern storage

WASHINGTON IRON WORKS

Since 1882

1500 Sixth Avenue South, Seattle 4, Washington

MFRS. OF LOGGING EQUIPMENT, CRANES AND CABLEWAYS, PULP PRESSES, HYDRAULIC PRESSES AND ACCESSORIES

. . . for more details, circle No. 34 on Reader Service Postcard

HERE IS YOUR ROUNDUP of exhibits and talks that will be featured at the 11 Western Metal Congress-Exposition scheduled for March 16-20 in Los Angeles.

Starting on this page are listings and previews of exhibits that will fill the Pan-Pacific Auditorium and specially erected pavilions.

And following are the programs for the technical sessions which will be held March 16-20 in the Ambassador Hotel, Los Angeles.

Be sure to look us up. We'll be in booth 961.

Attending the 11th Western Metal Exposition and Congress March 16-20 in Los Angeles will be a simple matter.

Thousands of admission-invitations to the Exposition are being mailed to members of 37 participating technical societies in the Western area. In addition, exhibitors are forwarding thousands more of these admission-invitations to customers and friends.

These will entitle holders to register without cost to attend the show on all five days of its run at Pan-Pacific Auditorium and pavilions. Without an admission-invitation, there will be a $1 registration fee. **Hours: noon to 10:00 p.m.; last 2 days 10:00 a.m. to 6:00 p.m.**

To attend the Congress sessions of American Society for Metals, American Welding Society and Metals Branch—Southern California Section, American Institute of Mining and Metallurgical Engineers, one need merely walk into the Ambassador Hotel, go to the meeting room and take a seat.

This open-door rule applies as well to ASM's Explosive Forming sessions.

Society for Nondestructive Testing will have a moderate registration fee for attendance of its technical meetings.

Exhibitors List and Booth Numbers

A

Aaron Machine Co. of Calif.	914
Absco, Inc.	365
Ace Drill Bushing Co., Inc.	925
Acme Steel Company	215
Acoustica Associates, Inc.	921
Aerosmith Tool & Die Co.	106
Airline Welding & Engineering Co.	105
Air-Maze Corporation	968
Air Reduction Pacific Company	686
Airsupply Company	523
Alexander Machinery Co., Inc.	160
Allison-Campbell Division	519
Allspray Company	315
"Alnor" Instruments	502
Alpha Molykote Corporation	1041
Amchem Products, Inc.	735
American Brake Shoe Co.	416, 560
American Brass Company	466
American Chain & Cable Co., Inc.	519
American Chemical Paint Co.	735
American Hardware Corp.	227
American Machine and Foundry Co.	1126
American Machine & Metals, Inc.	435
American Platinum & Silver Div.	747
American Pullmax Co., Inc.	535
American Smelting & Refining Co.	616
Amersil Quartz Division	747
Amplex Division, Chrysler Corp.	616
Anachrome Corporation	579
Anadite, Inc.	579
Anderson Equipment Co.	650
Apprenticeship Standards Div.	
Arcair Company	935
Archdale & Co., Ltd., James	825
Arcweld Manufacturing Co.	958
Aronson Machine Co.	116
Arrowsmith Tool and Die Co.	108
Asco Sintering Corporation	570
Atlas Press Company, Clausing Div.	131
Atomics International Div.	763
Austenal, Inc.	275
Austin Industrial Corporation	342
Austin Tool Co., Inc.	942

B

B-H-S Machinery Sales Co. 165
Baird-Atomic, Inc. 967
Baj Tool Company 687
Baldwin-Lima-Hamilton Corporation (Electronics & Instrumentation Div.) .. 454
Barber-Colman Company 532
Barnes Corp., John S. 578
Baron Industries of California 341
Battelle Memorial Institute 126
Bausch & Lomb Optical Co. 216
Beaver Tool & Engineering Corp. 280
Beryllium Corp. 808
Black & Decker Manufacturing Co. 636
Blakeslee & Co., G. C. 536
Bliss Co., E. W. 302
Braeburn Alloy Steel Corp. 524
Branson Ultrasonic Corp. 566
Braun Chemical Co. 220
Bridgeport Machines, Inc. 837
Bronz-Aloy Corporation 238
Brown & Sharpe Mfg. Co. 1018
Brush Beryllium Company 951
Buck Tool Company 173
Budd Company 550
Buehler, Limited 230

C

California Alloy Products Co. 325
California Dept. of Industrial Relations ..
California-Doran Heat Treating Co. 331
California State Polytechnic College ....
Campbell Abrasive Cutting Machines Div. 519
Castle & Company, A. M. 820
Cazeneuve Sales Company 125
Cerro de Pasco Sales Corp. 1121
Chainveyor Corporation 602
Challenge Machinery Co. 1137
Chemical Contour Division 350
Chicago Rivet & Machine Co. 571
Chicago Tool & Engrg. Company 945
Cleveland Pneumatic Industries 691
Climax Molybdenum Company 719
Coast Tool Company 1064
Cobalt Information Center 125
Cold Metal Products Co. 465
Collins Microflat Co. 840
Color-Matic Sales & Service Co. 761
Commander Manufacturing Co. 531
Commerce, U. S. Department of Compton Foundry 628
Consolidated Electrodynamics Corp. 375
Coulter Steel & Forge Co. 682
Crucible Steel Co. of America 354
Currier Company 176

D

Dake Corporation 624
Darling Abrasive & Tool Co. 136
Darnall Machinery Co. 738
Darwin and Milner, Inc. 1127
De Laval Pacific Company 270
Del Mar Company, W. H. 578
Delta Power Tool Div. 316
Denison Engineering Div. 560
Detrex Chemical Industries, Inc. 415
Detroit Stamping Co. 1111
De Walt Division 1126
Diamond Machine Tool Corp. 765
Diamond Saw Works, Inc. 639
Dickerman Mfg. Co., H. E. 1127
Dillon & Co., Inc., W. C. 1028
Diversey Corporation 370
Dolliver & Brothers 725
Dow Chemical Company 939
Ducommun Metals & Supply Co. 150
Duff, Inc., Gordon 650
Du Maurier Co. 1040

E

Eastman Kodak Company 359
Eclipse Fuel Engineering Co. 337
Electric Marketeer Mfg. Co. 1052
Electro Alloys Division 416
Electro Metallurgical Co. .....
Electronics & Instrumentation Div. 454
Engelhard Chemical Division 747
Engelhard Industries, Inc. 747
Engineer Company 416
Erb & Gray 574
Eutectic Welding Alloys Corp. 601

F

Fabriform Metal Products 334
Fannon Products Co., John J. 315
Far-Best Corporation 655
Fenn Manufacturing Co. 809
Fenway Machine Co., Inc. 1022
Fessler & Company, R. C. 1037
Fiedler, Inc., C. O. 922
Firth Sterling, Inc. 328
Freeman Co., L. H. 134
Frey Industrial Supply Co. 1157

G

General American Transportation Corporation 1045
General Controls Company 319
General Metals Corp. 221
Gianinni Plasmadyne Corp. 582
Goodrich Company, B. F. 523
Goodrich Aviation Products Division, B. F. 523
Graham Transmissions, Inc. 578
Gratiot Co., Jules D. 968
Griggs Co., M. K. 260
Gulton Industries, Inc. 1002

H

Hahn, Hallett & Willcutt Machinery Corporation 642
Harnischfeger Corporation 365
Harron, Rickard & McCone Co. of Southern California 633
Harshaw Chemical Company 725
Hayes, Inc., C. I. 272
Haynes Stellite Company .....
Heidrich-Nourse Co. 860
Heinze Company, A. G. 825
Heli-Coil Corporation 835
Heller Machinery Co. 843
Heller Tool Company 683
Heller's Son, Inc., E. G. 843
Herbert Limited, Alfred 242
Herrmann Associates, Carl W. 582
Hevi-Duty Electric Company 187
High Voltage Engineering Corp. 625
Hilliard Corporation 968
Hirschmann Co., Inc., Carl 711
Hobart Brothers Company 650
Holden Co., A. F. 425
Houghton & Co., E. F. 472
Howard Foundry Company 350
Hufford Corporation 115

I

Illinois Testing Laboratories, Inc. 502
Immersion Heating Equipment Co. 432
Industrial Combustion & Furnace Co. 337
Industrial Tectonics, Inc. 816
Instron Engineering Corp. 848
Instrumentation Sales 1042
International Nickel Co. 360
Ionic Electrostatic Corp. 952
Ipsen Industries, Inc. 260

J

Jenness Co., Don 1064
Jiffy Disintegrators, Inc. 902
Jones & Laughlin Steel Corp. (Strip Steel Division) 465
Jordan Controls Company 578

K

KSM Products, Inc. 856
Keith Co., W. P. 442
Kerns Company, L. R. 402
Kerns Pacific Corporation 402
King Publications 951
King Tester Corporation 665
Kingwell Bros., Limited 616
Kolene Corporation 678
Krouse Testing Machine, Inc. 550
Krusen Wire & Supply Co. 951
Kwikset Powdered Metal Products 227

L

Laboratory Equipment Corp. 722
Ladish Pacific Division 542
Laine-Eversoll Co. 1105
Lanly Company 416
Lapeer Manufacturing Co. 1127
Latrobe Steel Company 847
LeFiell Manufacturing Co. 528
Lepel High Frequency Labs., Inc. 654
Levinson, Harry 1002
Liberty Industrial Sales, Inc. 812
Lindberg Engineering Co. 660
Linde Company 490, 284
Lison Company, R. J. 1152
Littell Machine Co., F. J. 165
Los Angeles Chemical Co. 722
Los Angeles Dept. of Water & Power 121
Lufkin Rule Company 146

M

M. B. I. Export & Import, Ltd. 159
Machinery Sales Company 242
Machine Tool Mfgs. Affiliates 762
Magnaflux Corporation 274
Makepeace Division, D. E. 747
Mallory-Sharon Metals Corp. 1151
Man-Au-Cycle Corp. of America 478
Marshall Tool & Supply Corp. 819
Marwedel, C. W. 1157
Max Erb Instrument Co. 515
Maxon Premix Burner Co. 416
Mead Specialties Company 1058
Merit Products, Inc. 741
Merz Engineering, Inc. 140
Metal Finishing Engineers & Equipment Manufacturers 922
Metal Improvement Company 182
Metallizing Engineering Co., Inc. 1134
Metal Removal Co. 919
Meyer Sheet Metal Machinery Co. 165
Michael Agency, Claude 581
Microcast Division 275
Micrometrical Manufacturing Co. 136
Milbro Engineers 959
Miller Electric Manufacturing Co. 460
Milwaukee Electric Tool Corp. 842
Minneapolis-Honeywell Regulator Co. (Industrial Division) 322
Modern Manufacturing Co., Inc. 1143
Monarch Tools, Inc. 670
Montague Harris Company 165, 159
Muhr and Bender 843

N

NRC Equipment Corp. 582
National Carbon Company .....
National Diamond Laboratory 1141
National Electric Instrument Div. 747
National Forge Company 682
National Furnace Co., Inc. 333
National Standard Company 951
National Supply Company 450
Natural Gas Bureau 434
Natural Gas Equipment, Inc. 416
Nemec Burners 327
New Hermes Engraving Machine Corporation 947
Nobur Manufacturing Company 1021
Nordson Corporation 176
North American Aviation, Inc. 720
North American-Viking Drill Co. 1158
Norton Company 744
Nuclear Systems Division 550
Numatic Engineering 862

O

Oakite Products, Inc. 567
Ohio Crankshaft Company 423
Olin Mathieson Chemical Corp. 465
Olivetti Corp. of America 1072
Olsen Testing Machine Co., Tinius 265
O'Neil-Irwin Manufacturing Co. 516
Opto-Metric Tools, Inc. 112

P

Pacific Coast Gas Association 434
Pacific Combustion Engineering Co. 502
Pacific Scientific Company 265, 416
Pacific Tube Company 233
Partlow Corporation 265
Peck-Lewis Corporation 1127
Penn Metal Co., Inc. 1038
Pennrold Division 951
Perkin Engineering Corporation 1138
Perlmuth Electronics Association 1002
Philips Electronics, Inc. 226
Phillips & Co., A. J. 159
Phillips Manufacturing Co. 469

you cast for trout

— — —

NOT STEEL CASTINGS

Fishing around for a steel casting source is fine when you don't care about low end cost,* delivery or service. Sometimes it's even fun to talk to all the different vendors when you have a slow day.

But it isn't fun when rejections or late arrival of castings cause a production shutdown.

And this is where Pacific Steel comes in. We've got foundry servicemen who will consult directly with your design engineers (to take care of those tolerances.) We've got technical and operating personnel who are proud of their low rejection record, and our servicemen follow through on jobs to assure no delay in delivery.

It all boils down to the fact that Pacific Steel offers ideas, quality and service. And at the same price you'd pay if you went fishing for steel castings.

***(Ask us what we mean by lowest end cost.)**

PACIFIC

PACIFIC STEEL CASTING CO.

1333 2nd St., Berkeley, Calif.

LA 5-9200 EN 1-0983

. . . for more details, circle No. 35

Picco, Inc. . . . 238
"POP" Rivet Division . . . 757
Prommco, Inc. . . . 836
Pyrometer Instrument Co., Inc. . . . 134

Q

Quality Control Company . . . 140

R

Radio Frequency Company, Inc. . . . 1105
Rankin Bros. Engrg. & Sales, Inc. . . . 670
Ransburg Electro-Coating Corp. . . . 959
Rathbone Corporation . . . 682
Reliance Magnesium Company . . . 939
Relton Corp. . . . 1057
Richard Brothers Punch Div. . . . 1127
Riehle Testing Machines Div. . . . 435
Rigidized Metals Corp. . . . 674
Rockwell Manufacturing Co. . . . 316, 281
Ross Engineering Corp., J. O. . . . 438
Ryerson & Son, Inc., Joseph T. . . . 643

S

S & S Machinery Company . . . 478
Sales Engineering Service . . . 938
Sanford Process Company . . . 655
Santa Monica City College . . .
Scherr Co., Inc., George . . . 712
Scherr-Tumico Company . . . 712
Schrader's Son, A. . . . 366
Scientific Electric, Inc. . . . 952
Scovill Manufacturing Co., Inc. . . . 366
Seaboard Machinery Company . . . 633
Service Diamond Tool Company . . . 140
Sheldon Machine Company . . . 633
Short Run Stamping Company . . . 130
Sieburg Industries, Inc. . . . 1061
Simonds Abrasive Company . . . 575
Simonds Saw & Steel Company . . . 575
Size Control Company . . . 140
Skee Tool Company . . . 942
Smith Co., Claude B. . . . 134
Smith Welding Equipment Co. . . . 677
Solar Combustion Co. . . . 327
South Bend Lathe Works . . . 1014
Southern Counties Gas Co. of California . . . 434
Southwestern Agencies . . . 1045
Spar-Tan Engineering Co. . . . 527
Stackbin Corporation . . . 972
Stark Company, Dutch . . . 1146
Starrett Co., L. S. . . . 632
Stone Machinery Co., Inc. . . . 192
Stretch Forming Division . . . 115
Sunbeam Equipment Corp. . . . 428
Sunnen Products Company (Industrial Div.) . . . 1157
Supercraft Products Company . . . 1161
Supergrate Open Steel Flooring Co. . . . 1144
Superior Tube Company . . . 602
Supreme Products Corporation . . . 812
Surface Combustion Corp. . . . 416
Surface Systems Division . . . 922

T

Tatnall Measuring Systems Co. . . . 550
Technical Service, Office of . . .
Tempil Corporation . . . 473
Thomson Mfg. Co., Judson L. . . . 725
Timken Roller Bearing Company . . . 682
Tin Research Institute, Inc. . . . 122
Titan Metal Manufacturing Co. . . . 179
Titanium Fabricators, Inc. . . . 1139
Tocco Division . . . 423
Torrance Brass Foundry, Inc. . . . 928
Traub Automatic . . . 160
Trent Tube Company . . . 354
True-Trace Sales Corporation . . . 748
Tubular Micrometer Company . . . 712
Tubular Rivet & Stud Company . . . 640
Turbo-Cast, Inc. . . . 350
Turco Products, Inc. . . . 429
Turnkey Engineering Co., Inc. . . . 420

U

Ultrasonic Testing & Research Laboratory . . . 964
Union Carbide Corporation . . . 284, 382, 490
Union Manufacturing Co. . . . 1127
United Shoe Machinery Corp. . . . 757
United Specialties, Inc. . . . 1166
U. S. Department of Commerce . . .
U. S. Electrical Motors, Inc. . . . 479

V

Vanadium-Alloys Steel Co. . . . 617
Vanadium-Pacific Steel Co. . . . 617
Van Waters & Rogers, Inc. . . . 220
Veeco Vacuum Corporation . . . 582
Victor Equipment Company . . . 654
Viking Drill & Tool Co. . . . 1158

W

Wadkins Co. of England . . . 242
Walker-Turner Division . . . 281
Wall Colmonoy Corporation . . . 515
Wells Manufacturing Corporation . . . 441
Wesrep Corporation . . . 1164
West Coast Aero Tool Co., Inc. . . . 925
West Coast Machinery Co., Inc. . . . 825
West Point Manufacturing Co. . . . 1064
Western Industry (Publ.) . . . 961
Westinghouse Electric Corp. . . . 692
Wheelabrator Corporation . . . 1027
Wheelco Instruments Division . . . 532
Wills Machinery Co., W. T. . . . 342
Wilson Mechanical Instrument Div. . . . 265
Wiretex Manufacturing Company . . . 1105
Wyandotte Chemicals Corp. . . . 1058

Who's Exhibiting What

ACME STEEL CO., 4903 Pacific Blvd., Los Angeles 58, Calif.

Booth 215. Introducing a semi-automatic steel strapping machine (Model F4) which is power-operated, has uniform strap tension and is dial adjusted. There is no limitation on package size and the machine makes its own seals. Also see stitchers for metal-to-metal and metal-to-non-metal work, box stitchers and other steel strapping machines and accessories. Manning the booth will be **H. F. Middleton**, area manager; **J. R. Everett**, special representative; and Sales Reps **W. A. Youens, P. R. Koenig, F. C. Hartman, R. D. Vilas, J. E. Shafer**, and **R. H. Rosenberg.**

ACOUSTICA ASSOCIATES, INC., 10400 Aviation Blvd., Los Angeles 45, Calif.

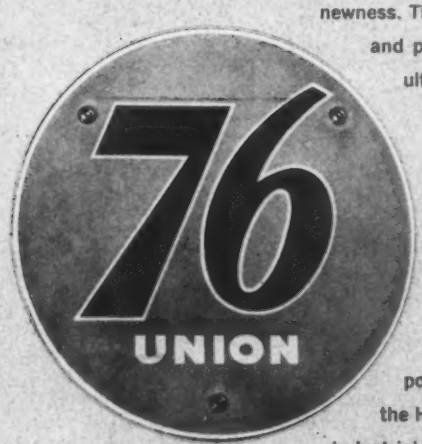
Booths 349, 351. See ultrasonic cleaning and pickling demonstrations every day on many different types of metal parts using ultrasonic cleaning systems (bench type and intermediate sizes). Also demonstrations of a liquid level sensing device and exhibits of a new type multipower transducer. **Frank DeLuca**, vice president and general manager, is in charge, while **Duncan S. MacGregor** and **Tom Lopker**, senior applications engineers; **John Thomas**, operations manager; and **Dick Houghton**, program director, are helping out.

. . . for more details, circle No. 36 on Reader Service Postcard

whatever the weathering...

CAMEO porcelain enamel signs defy nature. Every sign is a lasting beauty — its utility unfaded by the sun's fiercest rays, its luster undulled by wind, sand or dust. Frost, snow and ice will not streak these signs...rain serves only to cleanse them.

CAMEO porcelain enamel signs stand out with rich colors. Outlasting all other materials, their "Lifetime Finish" withstands generations of elemental attacks, yet retains its original diamond-hard newness. Their rugged strength and permanency result in lowest ultimate cost!



CAMEO advertising signs, like this one for Union Oil Company, are custom-created to your individual sign requirements—whether for building, truck, dealer or product identification.

CAMEO also produces quality porcelain enameled products for the Highway, Building and Industrial fields.

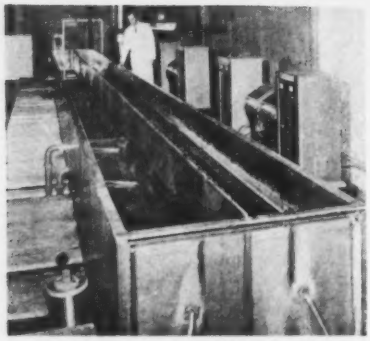
Cameo

CAMEO SINCE 1911

Write or call for a free informative booklet—"Porcelain Enamel for Advertisers"—from

CALIFORNIA METAL ENAMELING COMPANY

6904 East Slauson, Los Angeles 22, California RAymond 3-6351



World's largest ultrasonic cleaning tank (Air Force owned) in operation at Acoustica, Culver City Plant. System includes 160 immersible transducers driven by four 2000 watt generators.

AIR REDUCTION PACIFIC CO., San Francisco, Calif.

Booth 686. Featuring the MIG-et Aircomatic gun, pull gun, Model D automatic heliweld head and filler arc machine, along with Easyarc stainless steel electrodes, pencil size Heliweld holder and the ARc liquid cylinder.

ALEXANDER MACHINERY CO., Los Angeles, Calif.

Booth 160. Spotlight's on second operations by automatic screw machines, including models in 5/8, 1, 1 5/8, 2 3/16-in. capacities. And there's an automatic chucker in 5-in. capacity.

AMERICAN BRASS CO., Waterbury, Conn.

Booth 466. Displaying duplex condenser tubes, Plus-4 anodes and wave guides, along with copper and copper alloy sheet, wire, rod and tube. A special feature will be a U-bend condenser tube of extra long length. Fabricated metal goods and French small tube and metal hose round out the exhibit. In charge of the display is **W. H. Dowd,** exhibit manager.

AMERICAN PULLMAX CO., INC., Chicago, Ill.

Booth 535. See two models, the P-1 and Trimmer 5, of the Pullmax bevelling machine.

ANACHROME CORP., South Gate, Calif.

Booth 579. Showing many parts that have been hard anodized and precision plated, emphasizing those done by the Hardas process. Particularly interesting for electronics men specializing in dielectrics and thermoconductance. Electronic parts available for inspection.

ANADITE, INC., South Gate, Calif.

Booth 579. Aircraft and missile men can review the chemical milling process on aluminum, magnesium, mag-throium, stainless steel and titanium. And take a look at potentiometer mandrels, transistor washers, thermo conductors, color anodized parts, and vacuum cadmium-plated parts.

ARCWELD MFG. CO., P. O. Box 311, Liberty St. Ext., Grove City, Pa.

Booth 958. Exhibiting a testing machine (Model EE), creep rupture testers (Models JE and M-3), gradient furnace and retort Models RD-2600 and RB-1800. Ideal for high temperature materials testing, especially in metalworking, aircraft, titanium, missile and fabricating industries. To help you will be **Walter J. O'Connor,** president, **R. B. Corbett,** vice president, **W. H. Rector,** manager of sales and Sales Engineers **W. Ritter** and **A. E. Tkac.**

IODINE
The boldest statement ever made about a sanitation product!
New STERILE-AIRE BLOCKS with IODINE decrease bacterial count 99.6%
completely eliminate offensive odor
Laboratory* tests prove conclusively Sterile-Aire with Iodine is the most effective deodorant block you can use! Organic matter exposed to Sterile-Aire continuously for 18 hours shows a bacterial decrease of 99.6%, with no offensive odor present. After only one hour's exposure, a bacterial decrease of 94.2%. Sterile-Aire starts to work immediately. Releases powerful Iodine vapors that work day and night sanitizing, deodorizing. No other product compares with Sterile-Aire.
*Curtis & Tompkins, Ltd., San Francisco
Team STERILE with STERILE-AIRE for guaranteed sustained sanitizing
sterile-aire

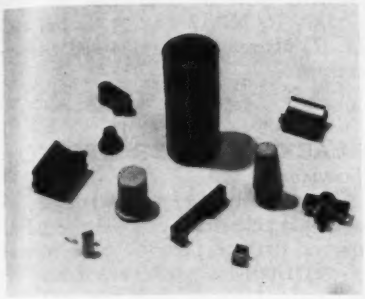
EASTERDAY SUPPLY COMPANY

A Division of T&S Industries

SAN FRANCISCO · *Fell and Gough Streets*
Fresno · Oakland · Sacramento
PORTLAND · *216 North Hancock Street*
Roseburg · Salem
LOS ANGELES · *901 E. 61st St.*
Long Beach · Palm Springs · Riverside
San Bernardino · San Diego · Santa Barbara
Orange County

MAIL THIS COUPON FOR FREE INFORMATION
EASTERDAY SUPPLY COMPANY
Catalog Office: Fell & Gough Streets, S. F.
Send FREE Easterday Catalog.
I also want information on ☐ Soil-Solv ☐ Sterile.
Name_____
Firm_____
Position_____
Address_____
City_____ State_____

. . . for more details, circle No. 37 on Reader Service Postcard



Just a few of the intricate powder metal products and other items on display at the Asco Sintering Corp. booth.

ASCO SINTERING CORP., Los Angeles, Calif.

Booth 570. Browso through displays of powder metal products, porous bronze and iron oil impregnated bearings, porous metal filters, machine and structural parts. Also soft iron magnetic parts and powdered metal specialties.

ATLAS PRESS CO., CLAUSING DIV., 1915 No. Pitcher St., Kalamazoo, Mich.

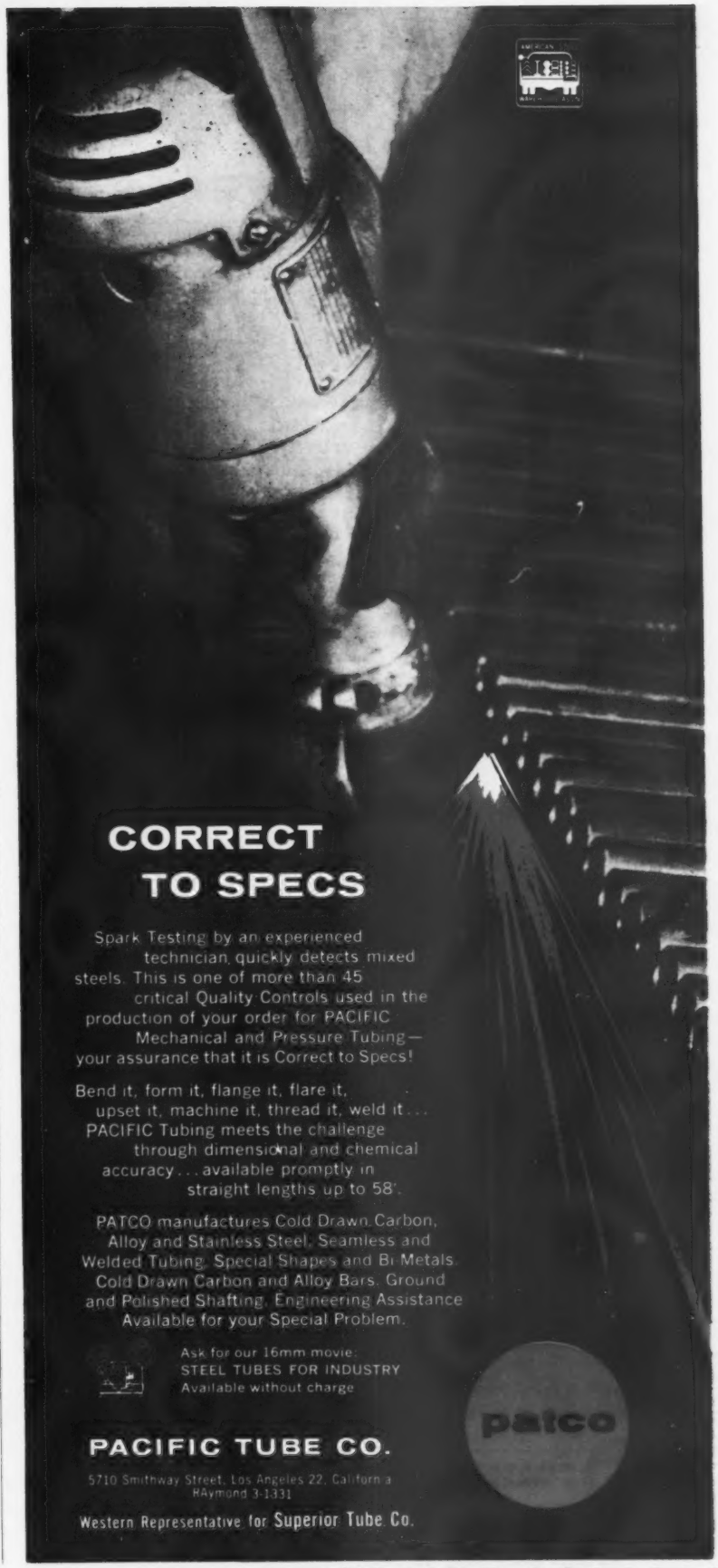
Booth 131. Introducing high speed precision lathes, hydraulic tracer lathes, and high speed lathes with hydraulic feeds. Other machine tools on display will be geared head lathes, back geared lathes, semi-automatic turning and boring lathes and vertical milling machines. Demonstrating Clausing machine tools will be **G. C. Nancarrow,** vice president, sales; **Flateau Allen** and **P. V. Honings,** field sales managers; **John Barnett,** engineer; and **Tony Evanson** and **Herb Foote,** sales.

ATOMICS INTERNATIONAL, DIV. OF NORTH AMERICAN AVIATION, INC., P. O. Box 308, Canoga Park, Calif.

Booth 763. Showing a model of fuel elements. For explanation see **C. Woolsey, M. Binstock, D. Sinizer** or **D. Calkins.**

AUSTIN INDUSTRIAL CORP., 76 Mamaroneck Ave., White Plains, N. Y.

Booth 342. Demonstrating horizontal and vertical milling machines, a universal grinder (7x12-in.), hydraulic production cylindrical grinder with plunge cut motion (10 x 16-in.), coordinate jig borer with projection optical sys-


CORRECT
TO SPECS
Spark Testing by an experienced technician quickly detects mixed steels. This is one of more than 45 critical Quality Controls used in the production of your order for PACIFIC Mechanical and Pressure Tubing—your assurance that it is Correct to Specs!
Bend it, form it, flange it, flare it, upset it, machine it, thread it, weld it... PACIFIC Tubing meets the challenge through dimensional and chemical accuracy... available promptly in straight lengths up to 58'.
PATCO manufactures Cold Drawn Carbon, Alloy and Stainless Steel, Seamless and Welded Tubing, Special Shapes and Bi-Metals. Cold Drawn Carbon and Alloy Bars, Ground and Polished Shafting, Engineering Assistance Available for your Special Problem.
Ask for our 16mm movie, STEEL TUBES FOR INDUSTRY Available without charge
patco
PACIFIC TUBE CO.
5710 Smithway Street, Los Angeles 22, California
RAymond 3-1331
Western Representative for Superior Tube Co.

. . . for more details, circle No. 38 on Reader Service Postcard

TUBULAR RIVET COST-SAVINGS MULTIPLY WITH MILFORD'S ASSEMBLY ANALYSIS

1. WE STUDY THE FUNCTION

2. WE DESIGN THE RIGHT PART

3. WE RECOMMEND THE BEST ASSEMBLY TECHNIQUE

Smart production men know that a cleverly designed product that can't be assembled economically is worse than no product at all! Milford helps with a wealth of assembly tips.

For the answers to assembly problems . . . *get in touch with Milford first!*

THE MILFORD RIVET & MACHINE CO.

MILFORD, CONNECTICUT • HATBORO, PENNA.
ELYRIA, OHIO • AURORA, ILL. • NORWALK, CALIF.

. . . for more details, circle No. 39

tem, vertical shaper with 5-in. stroke and horizontal shaper with 22-in. stroke. The jig borer will be operated on an actual production job. For all demonstrations see **W. T. Wills, Jr., M. H. Bloch** or **William Arter.**

BAIRD-ATOMIC, INC., 33 University Rd., Cambridge 38, Mass.

Booth 967. Sales engineers will be on hand to discuss emission and infrared spectrochemical instrumentation, illustrating with a direct reader and spectromet, research direct reading spectrograph, a complete three-meter spectrographic laboratory (three-meter grating spectrograph, spectrosource, densitometer comparator and accessories), and double beam infrared spectrophotometers (Model KM-1 and 4-55).

BARBER-COLMAN CO., Rockford, Ill.

Booth 532. Showing a round chart recorder, recorder controllers, dew control forms, new combustion safeguards, line and strip charts and electronic indicating controllers.

BARON INDUSTRIES, 241 W. Ave. 26, Los Angeles 31, Calif.

Booth 341. Spotlighting vapor degreasers and industrial ovens. For demonstrations of a new degreaser and automatic degreaser lid see **W. D. Hamilton, J. T. Hogan, F. H. MacQuarrie,** or **G. T. Yewell.**

BAUSCH & LOMB OPTICAL CO., Rochester 2, N. Y.

Booth 216. Take note of the direct reading optical gage (DR-25) which should result in cost cutting for manufacturers maintaining gage control. The instrument provides rapid measurements of various diameters or dimensions without requiring a master part or set plug. Other products on display: research metallograph, Balphot metallograph, 10-in. bench comparator and accessories, toolmakers' microscopes and stereomicroscopes. Watch for a new product which Bausch says will "provide a revolutionary innovation in instrument design." For information see **J. E. Tague,** manager, industrial sales; **E. S. Bissell,** district manager, West Coast; **R. M. Lisson, J. Sabel** or **D. R. Murray,** all sales representatives.

BLACK & DECKER MFG. CO., Towson 4, Md.

Booth 636. Introducing two portable electric drills, a ½-in. special drill to provide 62% more power than its predecessor and a low-priced ¼-in. drill for use in light automotive work, service trades and general industry. Don't overlook the dustless belt sander, magnetic drill press, impact wrenches and a complete line of drills, scruguns, tapguns and electric screwdrivers. On hand to answer questions will be **L. C. Kaefer,** Pacific Coast regional manager, **R. E. Stone,** Los Angeles district manager, and a full staff of sales representatives.

BRAEBURN ALLOY STEEL CORP., 5901 Sheila St., Los Angeles 22, Calif.

Booth 524. Exhibiting bar steel samples of various analysis, such as high speed, hot work, cold work, chisel steels, shear knives and tool bits. This one's for all tooling men. Manning the booth will be **Norman I. Stotz,** president, **Richard Harvey,** metallurgist, **John Parker,** district manager, and two sales representatives, **Rex Clayton** and **Bob Everts.**

BROWNE & SHARPE MFG. CO., Providence, R. I.

Booth 1018. Showing micrometer calipers, Vernier calipers, Vernier height gages, dial indicators, gage blocks, granite surface plates, permanent magnet sine plates and chucks, ground flat stock, precision ground tool steel, height setting gages, dial snap gages and other precision tools.

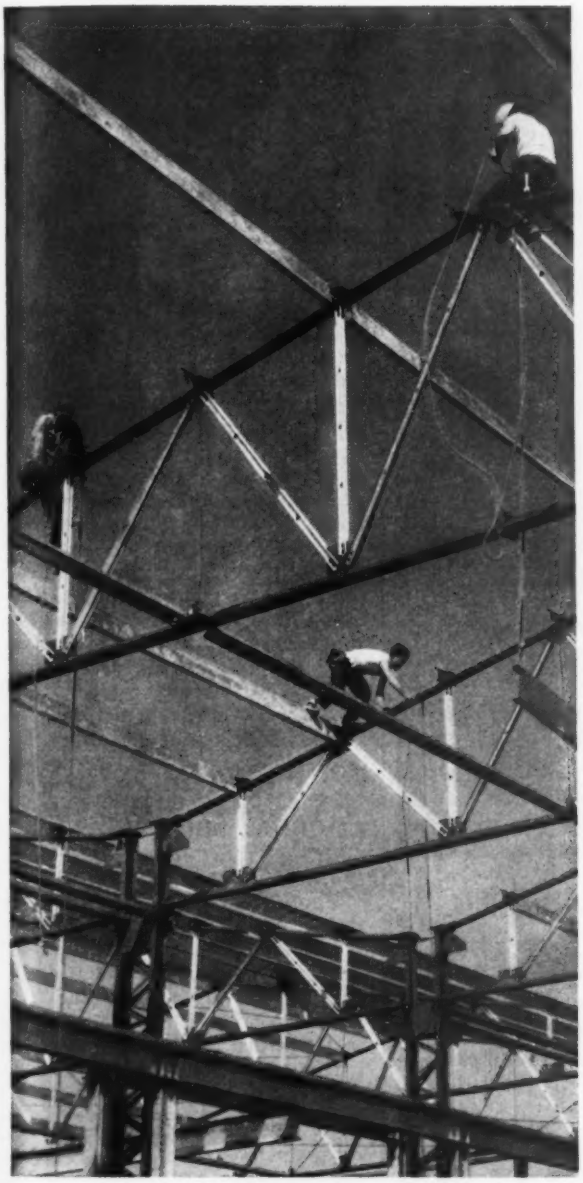
A. M. CASTLE, Los Angeles, Calif.

Booth 820. Building an exhibit around flame cutting and Blanchard grinding services. Will have the aluminum of Olin Aluminum Co.

CENTRIFUGAL CASTING CO., Long Beach, Calif.

Here you'll find centrifugal cast

Here's The Way To Save
BUILDING DOLLARS



Workmen assemble strong, lightweight roof structure of a big Truss-Type Armco Steel Building. Their work demonstrates three prime advantages of building the Armco Way.

FIRST, in the design stage, you gain the economies and convenience of pre-engineered, tested structurals as well as covering materials. Clear spans range to 100 feet, with wall and roof load designs specifically tailored for your area.

SECOND, in the construction stage, you'll find that precision-made parts go together quickly and correctly. Efficient Armco crews are equipped to do the erection job for you and your contractor.

THIRD, through long service, you gain low annual cost. In addition, Armco Buildings earn dividends with their limited maintenance requirements. Special Armco Steels like ZINCGRIP® and ALUMINIZED STEEL are well known for their durability. And special design features like the sloping, self-cleaning surfaces of the truss components add extra value.

Get complete data about the Armco Steel Building that meets your building needs. Send the coupon to Armco Drainage & Metal Products, Inc., 2180 Milvia Street, Berkeley 4, California, or P. O. Box 751, Federal Station, Portland 7, Oregon.

Send details about Armco Buildings for the following use:

_____ Approximate size_____.

NAME_____

TITLE_____

FIRM_____

STREET_____

CITY_____ ZONE_____

STATE_____

ARMCO DRAINAGE & METAL PRODUCTS

Subsidiary of ARMCO STEEL CORPORATION

OTHER SUBSIDIARIES AND DIVISIONS: Armco Division • Sheffield Division • The National Supply Company
The Armco International Corporation • Union Wire Rope Corporation • Southwest Steel Products

. . . for more details, circle No. 40 on Reader Service Postcard

NEW WATER-WASH SPRAY BOOTH

HYDROMIST

A really efficient, competitively-priced water-wash booth for the first time! The new Hydromist reduces "shut-down time" for cleaning and skimming with exclusive easy maintenance features... provides improved overspray removal for faster, better production! Available in sizes for every job and location... with or without conveyor openings. Write or phone today for descriptive brochure... and check all these important quality features before you buy!

SprayKing

AUTOMOTIVE AND INDUSTRIAL FINISHING SYSTEMS

SEE IT AT THE SHOW

Visit SprayKing's exhibit at the Western Metals Show, Booth 866 in Pavilion No. 1... see a Hydromist spraybooth in operation... plus latest Fostoria Infra-Red oven equipment and other new developments.

SPRAYKING, INC. / 750 CASTELAR ST., LOS ANGELES 12, CALIF. MAdison 5-7666

... for more details, circle No. 41 on Reader Service Postcard

steel tubes, cast iron stainless and super alloys, static sand castings, certified master alloys, ring roll forged centrifugal castings.

CHAINVEYOR CORP., Los Angeles, Calif.

Booth 602. Here you'll see a full-size operating conveyor with its combination vertical and horizontal curves. All component parts, such as driving mechanism and special carriers, will be present. Overseeing demonstrations will be **Patrick T. Rauen,** president, **James N. Rauen,** vice president, and **Frank Burkhead,** chief engineer.

COBALT INFORMATION CENTER, c/o Battelle Memorial Institute, 505 King Ave., Columbus 1, Ohio.

Booth 126. Learn about cobalt from 20 technical publications on the history, properties, uses, physical metallurgy, fabrication, coatings and corrosion, chemicals, and recent research work on the metal. If you want more information you can turn to 41 data sheets on cobalt-containing alloys and then to samples of cobalt in high-temperature alloys, magnets, cutting materials, bearings, medicines, glass, ceramics and chemicals. A must for aircraft and missile men. Consult with **Dr. F. D. Morral,** division consultant for Cobalt and **E. W. Cawthorne,** assistant division consultant for Battelle.

COLLINS MICROFLAT CO., 3249 W. El Segundo Blvd., Hawthorne, Calif.

Booth 840. Highlighting Microflat products—black granite surface plates, toolmakers' flats, straight edges, heavy-duty angle iron stands, angle plates and parallels. Ask **Lee Collins,** president, and **Clifford Anderson** for information.

COMPTON FOUNDRY, Compton, Calif.

Booth 628. Featuring recent applications of Meehanite metal to customers' new machinery castings. Also samples from a large 60 bar stock, plate stock, standard bar stock shapes (rounds, discs, rectangles, squares, plates and angle irons).

CONSOLIDATED ELECTRODYNAMICS CORP., Rochester, N. Y.

Booth 376. Here's the PMC diffusion pump lines, vacuum pumping system, vacuum coater with 500-v. glow discharge unit, vacuum arc furnace and high-vacuum valves and gages.

COULTER STEEL & FORGE CO., 1494 67th St., Emeryville, Calif.

Booth 682. High temperature forgings for the aircraft and missile industry and tool steel forgings to steel tool and die specifications will be featured at this booth. Also on display will be Graph Mo forgings sample dies. At the booth will be: **James V. Coulter,** president; **William D. Haralson,** manager, Los Angeles district; **Phil Bender** and **Toby Larsen,** sales engineers.

CRUCIBLE STEEL CO. OF AMERICA, P. O. Box 2518, Pittsburgh 30, Pa.

Booth 354. Picturing many products of the company, such as stainless, tool steel, magnets, industrial springs, Trentweld, stainless and high alloy tubing, vacuum melted metals, alloy steel, special shapes and titanium on 18 A-rack portable exhibit panels. Technical assistance will be provided by specialists in all these fields, while general information will come from **W. H. Wiewel,** senior vice president, **L. L. Ferrall,** executive vice president and a host of other personnel.

DARNALL MACHINERY CO., 315 E. Washington Blvd., Los Angeles, Calif.

Booth 738. Displaying Strohn Swiss-type automatic, Dormac mill, Pacific mill and Clausing-Colchester lathe. And note the automatic and tractor unit lathes. **W. M. Darnall,** owner; **Ken Matta,** technical engineer; **Jerry Lewis,** branch manager, and three salesmen will be present.

DE LAVAL PACIFIC CO., Millbrae, Calif.

Booth 270. Showing a gyro tester, high speed test tube centrifuge, coolant clarifier (Model 115), centrifugal clarifier for grinding coolants, and cutting oils.

BRODHEAD

STOCKS AND FABRICATES

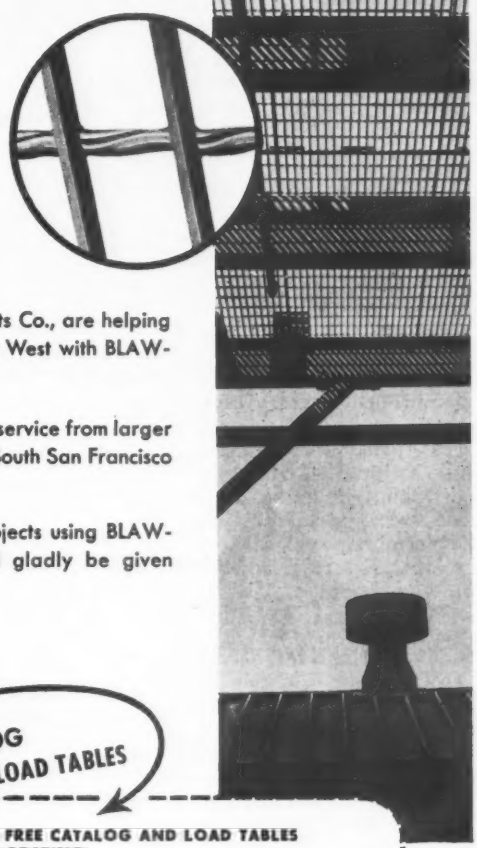
•

BLAW-KNOX

ELECTROFORGED

STEEL GRATING and STAIR TREADS

For Distribution to the eleven Western States



BLAW-KNOX STEEL GRATING meets the normal hazardous conditions in plants for safety strength and economy.

BRODHEAD Steel Products Co., are helping build a bigger and better West with BLAW-KNOX Steel Grating.

BRODHEAD offers faster service from larger stocks maintained in their South San Francisco plant.

A LIST OF FIRMS and projects using BLAW-KNOX Steel Grating will gladly be given upon request.

FREE

CATALOG

OF BLAW-KNOX LOAD TABLES

PLEASE RUSH ME YOUR FREE CATALOG AND LOAD TABLES OF BLAW-KNOX STEEL GRATING.

Name.....

Firm.....

City.....Zone....State.....

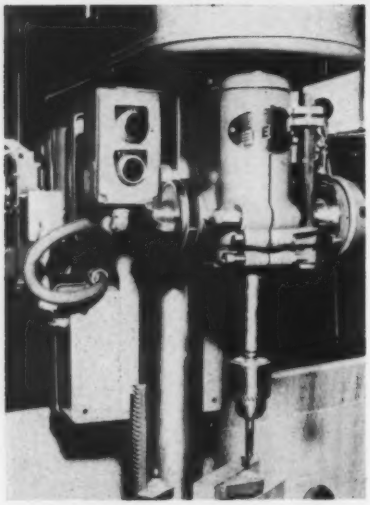
BRODHEAD STEEL PRODUCTS CO.

143 S. LINDEN AVE. SOUTH SAN FRANCISCO

PLAZA 6-4850

BLAW-KNOX Grating Representatives Are Located In Principal Western Cities.

. . . for more details, circle No. 42 on Reader Service Postcard



This is an automatic tapper drill press using a reversing motor. It will be displayed in the Delta Power Tool booth.

DELTA POWER TOOL DIV., ROCKWELL MFG. CO., Pittsburgh, Pa.

Booth 316. Introducing a 10-in. metal-cutting lathe with variable-speed drive and ¾-in. collet capacity, also a 20-in. metal cutting band saw. Other displays will include an 11-in. metal lathe, hand screw machine, and a 17-in. and a 15-in. drill press. A special feature is an automatic tapper drill press using a reversing motor. Ask **Byron E. Coon,** sales manager, about it, or see **F. P. Maxwell,** vice president, **John MacCrossen,** regional sales manager, or **Ben Eldridge,** metalworking product manager.

DENISON ENGINEERING DIV., AMERICAN BRAKE SHOE CO., 1160 Dublin Rd., Columbus 16, Ohio.

Booth 560. Highlighting hydraulic flow control valves, directional control valves, pumps and fluid motors. Also high speed hydraulic pumps for aircraft ground support systems. Look up **Denison Neale,** director of sales; **R. H. Krepps,** general sales manager; **V. P. Preidis,** Western regional manager; **R. C. Clouse,** advertising manager, and other assistants.

DETROIT STAMPING CO., 350 Midland, Detroit 3, Mich.

Booth 1111. Introducing several new types of De-Sta-Co toggle clamps for holding parts for drilling, riveting, glueing and many other processes. Ask **G. H. Roberts,** president, for new applications, or see Sales Reps **John Haas, Hadley Hatch** or **Jim Holt.**

DIAMOND MACHINE TOOL CORP., 5111 Coffman Pico Rd., Pico Rivera, Calif.

Booth 766. See the new 4-post Multi-Max punch press which features an underdrive arrangement. The machine lends itself particularly well to any application that requires a large bed size . . . such as hardboard perforating, notching or piercing on large sheets, etc. It is also useful at high speeds, up to 1,000 strokes per min. Other display products include power and foot shears, milling machines and O.B.I. presses with air clutches. On tap to explain operations will be: **Stanley Swiatek,** president; **Tom O'Connor,** sales manager; and sales engineers: **Ed Brenot, Ed Swiatek, Steve Swiatek** and **Bob Arias.**

W. C. DILLON & CO., INC., Van Nuys, Calif.

Booth 1028. If you have measuring problems take a look at the testing machines, mechanical force measuring gages, dial type thermometers and traction type dynamometers.

DIVERSEY CORP., 1820 Roscoe St., Chicago 13, Ill.

Booth 370. Illustrating a bright dip process for de-scaling and brightening stainless steel, along with an anodizing unit, aluminum etching compound and stripper for anodized coatings.

DUCOMMUN METALS & SUPPLY CO., Los Angeles, Calif.

Booth 150. Missile and aircraft component makers use carbon, alloy and stainless steel and aluminum to make parts such as those that will be on display.

Many types of welding equipment will be on display, and various welding techniques will be demonstrated.

EASTMAN KODAK CO., Rochester, N. Y.

Booth 359. In-plant photography products and apparatus will be posed for examination, along with Kodak contour projectors, accessories and associated optical gauging equipment.

ECLIPSE FUEL ENGINEERING CO., Rockford, Ill.

Booth 337. Spotlight here is on a complete gas-fired industrial combustion assembly which will be in full operation along with the new Unimix machine for automatic provision of air-gas mixtures for combustion equipment. See also a wide variety of gas burners, air-gas mixing equipment and valves, all used in foundries for oven and furnace firing, and in furnaces for heat treating, annealling, drawing and other operations. Personnel will include Sales Engineers **C. R. Wirth** and **Leroy Kirkpatrick,** as well as **A. D. Wilcox,** vice president; **Erwin Hirschberg,** sales manager; and **Eugene Skerkoske,** chief engineer; all of the Industrial Combustion Division.

ELECTRIC MARKETEER MFG. CO., 2195 W. Highway 99, Redlands, Calif.

Booth 1052. Featuring electric trucks and cars for materials handling, personnel transportation and other specific uses. Discuss specific uses with **R. S. Brinkerhoff,** factory representative, or **Lauri Maki,** salesman.

ENGELHARD INDUSTRIES, INC., 133 Astor St., Newark 2, N. J.

Booth 747. Showing a palladium diffusion unit, Deoxo gas purifier and puridryer, borescope, fused quartz, brazing alloys and fluxes, and roll forms. See the special demonstration of silver brazing. And talk with **G. R. Briechle,** advertising manager; **J. Nickerson,** vice president; **W. Schmidt, J. Ross, S. Cross, D. Yahan** and **R. Benton.**

EUTECTIC WELDING ALLOYS CORP., Flushing, N. Y.

Booth 601. See EutecTrodes for arc welding and EutecRods for torch welding of aluminum, magnesium, steels, cast irons and super alloys, for resistance to ex-

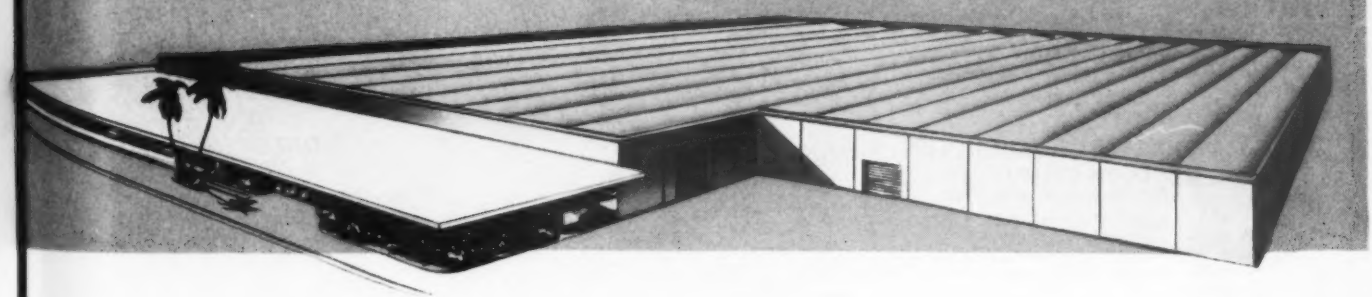
LOS ANGELES PLANT

The Center of Steel Service in the West...

J&L's Los Angeles Plant maintains one of the largest stocks in the West of stainless steel sheet, strip, bar, wire and plate; aircraft quality alloys; spring steel; coated steels; precision cold rolled strip steels; aluminum, brass and copper.

FOR SERVICE CALL:

LOS ANGELES: RAymond 3-4581 • **SAN FRANCISCO:** DOuglas 2-1794 • **SAN DIEGO:** CYpress 5-2161
SEATTLE: EMerson 4-1040 • **PHOENIX:** AMherst 5-5490 • **SALT LAKE CITY:** CRestwood 7-3810



VISIT BOOTH NO. 465
WESTERN METAL SHOW
PAN-PACIFIC AUDITORIUM, LOS ANGELES
MARCH 16-20

LOS ANGELES PLANT

STAINLESS AND STRIP DIVISION

Jones & Laughlin Steel Corporation • STAINLESS and STRIP DIVISION • Los Angeles 22, Calif.

. . . for more details, circle No. 43 on Reader Service Postcard

MAKE YOUR OWN

HERC-ALLOY

CHAIN ASSEMBLIES

with all components furnished from your distributor's stock.

CM Hammerlok®

COUPLING LINK

- NO PEENING
- NO WELDING

- Hammerlok is made of alloy steel... is stronger than Herc-Alloy chain... is thoroughly field tested.
- Write for literature or ask your industrial distributor about Hammerlok.
- Made by the makers of Herc-Alloy... the original alloy steel chain.

COLUMBUS McKINNON CHAIN CORPORATION

TONAWANDA, NEW YORK

DISTRICT OFFICES: NEW YORK CHICAGO • CLEVELAND

In Canada: McKinnon Columbus Chain Limited, St. Catharines, Ontario

... for more details, circle No. 44

tremes in heat and corrosion encountered in turbo-jet and rocket engines.

FABRIFORM METAL PRODUCTS, Los Angeles, Calif.

Booth 334. Will show parts and assemblies from brazing stage to completion, of interest to aircraft and electronics industries. Among other items will have a scale model, controlled atmosphere, electric furnace.

FENWAY MACHINE CO., INC., 3107 No. Broad St., Philadelphia 32, Pa.

Booth 1022. Introducing a new Nibbler capable of cutting ¼-in. metals. Also showing portable electric and pneumatic metal cutting tools for use in experimental shops, maintenance operations, sheet metal plants, aircraft plants and auto factories. Manning the booth will be **Joseph Yermish,** general manager; **James Mancini,** vice president; **D. J. Doot,** and **M. N. Thackaberry,** sales representatives.

R. C. FESSLER, Los Angeles, Calif.

Booth 1037. Operating a miniature of the Payoff Pak. Also see fluxes, key retrievers, welding gloves, work gloves, cutting tips and products of Page Steel and Wire Div. of American Chain & Cable Co.

GENERAL CONTROLS CO., 801 Allen Ave., Glendale 1, Calif.

Booth 319. Presenting the V-116 manual reset Hi-Flo gas fuel valve and the H-117 hydramotor Hi-Flo gas fuel valve with an animated display depicting the operation and special features. These valves are designed for on-off control and safety shut-off of fuel gasolines in boilers, industrial furnaces, larger conversion burners, and so on. Also see all the controls that make up an approved gas control system (pressure regulators, pressure controls, magnetic lever valves and magnetic gas valves), and a line of indicating counters and actuators. Personnel will include **Sumner Ladd,** sales manager, Industrial Controls Div.; **Stan Pachyn,** his assistant; **Harmon McLendon, Martin Sherry,** and others.

Magnaglo testing at General Metals Corp. Oakland plant. This and other testing methods used at General Metals will be explained at booth 221.

GENERAL METALS CORP., 18th and Florida Sts., San Francisco, Calif.

Booth 221. Watch the forging press and electric furnace in action in this booth. You can see how this company makes the latest aircraft and missile forgings. And you can see products ranging in size from 15 ton steel and iron castings to small items weighing less than a pound. On hand to answer your questions will be: **William E. Butts,** president; **Phillip McCaffrey,** general manager; **Malcolm McGregor,** chief metallurgist; **Roy Hoag,** sales manager; **A. W. Ostrander,** vice president for sales; **Michael E. Conway,** public relations director (these men are all from Oakland) and (from Los Angeles): **Harold Schmid,** vice president and plant manager; **Paul Crippen,** assistant manager; **William Shirley,** sales manager; and sales personnel from the plant at 5701 So. Boyle Ave., Los Angeles.

B. F. GOODRICH AVIATION PRODUCTS, 500 So. Main St., Akron, Ohio.

Booth 523. Here you'll see a continual demonstration of Rivnuts (hollow, threaded blind rivets) using various models of header tools. Rivnuts may be used as blind rivets, blind nut plates, or both, in all metals and come in many styles, types, grips and metals. Ask **R. H. Gill,** chief engineer, about them, or see **L. J. Fulop,** sales manager, or **M. W. Martin,** advertising manager.

HARNISCHFEGER CORP., Milwaukee, Wis.

Booth 365. Displaying an inter gas spot gun timer, utility welder and other welders. Stop and learn about tape controlled weld programming and controlled slope current build-up and delay.

GB

GET DATA AND LITERATURE YOU NEED

Use one of these postpaid* WESTERN INDUSTRY *Reader Service Postcards. They provide a quick way for you to get copies of know-how manuals and literature you want and full details on products and services described editorially or advertised in this issue. Simply circle appropriate key numbers on card, sign and drop it in the mail today— WESTERN INDUSTRY will have material sent to you promptly and without obligation.

Postage Will Be Paid by Addressee

No Postage Stamp Necessary If Mailed in the United States

BUSINESS REPLY CARD

First Class Permit No. 3755, San Francisco, Calif.

Postage will be paid by

WESTERN INDUSTRY

609 Mission St.

San Francisco 5, Calif.

1	32	63	94	125
2	33	64	95	126
3	34	65	96	127
4	35	66	97	128
5	36	67	98	129
6	37	68	99	130
7	38	69	100	131
8	39	70	101	132
9	40	71	102	133
10	41	72	103	134
11	42	73	104	135
12	43	74	105	136
13	44	75	106	137
14	45	76	107	138
15	46	77	108	139
16	47	78	109	140
17	48	79	110	141
18	49	80	111	142
19	50	81	112	143
20	51	82	113	144
21	52	83	114	145
22	53	84	115	146
23	54	85	116	147
24	55	86	117	148
25	56	87	118	149
26	57	88	119	150
27	58	89	120	151
28	59	90	121	152
29	60	91	122	153
30	61	92	123	154
31	62	93	124	155

156	187	218	249	280
157	188	219	250	281
158	189	220	251	282
159	190	221	252	283
160	191	222	253	284
161	192	223	254	285
162	193	224	255	286
163	194	225	256	287
164	195	226	257	288
165	196	227	258	289
166	197	228	259	290
167	198	229	260	291
168	199	230	261	292
169	200	231	262	293
170	201	232	263	294
171	202	233	264	295
172	203	234	265	296
173	204	235	266	297
174	205	236	267	298
175	206	237	268	299
176	207	238	269	300
177	208	239	270	301
178	209	240	271	302
179	210	241	272	303
180	211	242	273	304
181	212	243	274	305
182	213	244	275	306
183	214	245	276	307
184	215	246	277	308
185	216	247	278	309
186	217	248	279	310

Western Industry

READER SERVICE CARD—MARCH 1959

Circle key numbers for data and literature you want, free of charge. Please mail before May 31, 1959.

311	336	361	386	411	436	461
312	337	362	387	412	437	462
313	338	363	388	413	438	463
314	339	364	389	414	439	464
315	340	365	390	415	440	465
316	341	366	391	416	441	466
317	342	367	392	417	442	467
318	343	368	393	418	443	468
319	344	369	394	419	444	469
320	345	370	395	420	445	470
321	346	371	396	421	446	471
322	347	372	397	422	447	472
323	348	373	398	423	448	473
324	349	374	399	424	449	474
325	350	375	400	425	450	475
326	351	376	401	426	451	476
327	352	377	402	427	452	477
328	353	378	403	428	453	478
329	354	379	404	429	454	479
330	355	380	405	430	455	480
331	356	381	406	431	456	481
332	357	382	407	432	457	482
333	358	383	408	433	458	483
334	359	384	409	434	459	484
335	360	385	410	435	460	485

(Please print or type)

NAME_____

TITLE_____

COMPANY_____

_____

ADDRESS_____

_____

_____

WHAT'S YOUR PROBLEM TODAY?

Make use of WESTERN INDUSTRY'S special service to readers. These business reply cards save you time, effort and expense in obtaining literature you want and full details on products and services described or advertised in this issue.

Also use postcard to notify us about your change of title or address. For free tearsheets of articles, simply write in page numbers.

In addition, WESTERN INDUSTRY will help you locate sources of information concerning unusual plant operating problems that you may have. Write and describe your problem briefly, to: Editor, WESTERN INDUSTRY, 609 Mission St., San Francisco 5, Calif.

1	32	63	94	125	156	187	218	249	280	311	336	361	386	411	436	461
2	33	64	95	126	157	188	219	250	281	312	337	362	387	412	437	462
3	34	65	96	127	158	189	220	251	282	313	338	363	388	413	438	463
4	35	66	97	128	159	190	221	252	283	314	339	364	389	414	439	464
5	36	67	98	129	160	191	222	253	284	315	340	365	390	415	440	465
6	37	68	99	130	161	192	223	254	285	316	341	366	391	416	441	466
7	38	69	100	131	162	193	224	255	286	317	342	367	392	417	442	467
8	39	70	101	132	163	194	225	256	287	318	343	368	393	418	443	468
9	40	71	102	133	164	195	226	257	288	319	344	369	394	419	444	469
10	41	72	103	134	165	196	227	258	289	320	345	370	395	420	445	470
11	42	73	104	135	166	197	228	259	290	321	346	371	396	421	446	471
12	43	74	105	136	167	198	229	260	291	322	347	372	397	422	447	472
13	44	75	106	137	168	199	230	261	292	323	348	373	398	423	448	473
14	45	76	107	138	169	200	231	262	293	324	349	374	399	424	449	474
15	46	77	108	139	170	201	232	263	294	325	350	375	400	425	450	475
16	47	78	109	140	171	202	233	264	295	326	351	376	401	426	451	476
17	48	79	110	141	172	203	234	265	296	327	352	377	402	427	452	477
18	49	80	111	142	173	204	235	266	297	328	353	378	403	428	453	478
19	50	81	112	143	174	205	236	267	298	329	354	379	404	429	454	479
20	51	82	113	144	175	206	237	268	299	330	355	380	405	430	455	480
21	52	83	114	145	176	207	238	269	300	331	356	381	406	431	456	481
22	53	84	115	146	177	208	239	270	301	332	357	382	407	432	457	482
23	54	85	116	147	178	209	240	271	302	333	358	383	408	433	458	483
24	55	86	117	148	179	210	241	272	303	334	359	384	409	434	459	484
25	56	87	118	149	180	211	242	273	304	335	360	385	410	435	460	485
26	57	88	119	150	181	212	243	274	305							
27	58	89	120	151	182	213	244	275	306							
28	59	90	121	152	183	214	245	276	307							
29	60	91	122	153	184	215	246	277	308							
30	61	92	123	154	185	216	247	278	309							
31	62	93	124	155	186	217	248	279	310							

Western Industry

READER SERVICE CARD—MARCH 1959
Circle key numbers for data and literature you want, free of charge. Please mail before May 31, 1959.

(Please print or type)

NAME_____

TITLE_____

COMPANY_____

_____

ADDRESS_____

_____

_____

Postage Will Be Paid by Addressee

No Postage Stamp Necessary If Mailed in the United States

BUSINESS REPLY CARD
First Class Permit No. 3755, San Francisco, Calif.

Postage will be paid by

WESTERN INDUSTRY
609 Mission St.
San Francisco 5, Calif.

HARSHAW SCIENTIFIC DIV., Los Angeles, Calif.

Keynoting vacuum pumps, micro dynamometers and other laboratory apparatus.

Operator drills pilot hole through bottom dish of 0.030 in. tantalum reactor vessel lining.

HAYNES STELLITE CO., DIV. OF UNION CARBIDE CORP., Kokomo, Ind.

Booth 490. Three new products here: a 30-gal. chemical reactor vessel completely lined with tantalum sheet, refractory parts made of slip-case silicon nitride and metal ceramics, and copper-coated coils of hard-facing alloys in drawn tube form for mechanized applications. These alloys have been specifically designed to overcome the problems of equipment exposed to high temperatures, corrosive conditions or extreme wear.

HEIDRICH-NOURSE, 631 East Third St., Los Angeles 13, Calif.

Booth 860. If seeing is believing, you can see how these machines will work in your plant. There'll be actual demonstrations of various types of pneumatic machines: impact presses, marking machines, planishing machines, repeating hammer machines, and rubber stock cutting machines. This equipment can take care of the staking, riveting, impression marking, and sheet metal work in your plant.

HEVI-DUTY ELECTRIC CO., 2040 W. Wisconsin Ave., Milwaukee 1, Wis.

Booth 187. Operating a Clean-Line automatic heat treat furnace in addition to showing Circ-O-Therm laboratory oven and laboratory muffle furnace. The Clean-Line furnace will carburize nitride, carbonitride, or clean-harden parts under a protective atmosphere, and automatically

circle No. 45 on Reader Service Postcard

CAMPBELL CHAIN OPENS NEW PLANT

Now, Complete Chain Making Facilities For The First Time On The West Coast

Campbell Chain's new plant at Alvarado, California is *the most modern chain plant in the nation.* The completely integrated plant is equipped to supply Campbell warehouses in Portland, Seattle and Los Angeles, and makes possible same-day or overnight shipment of Campbell Chain's complete line of welded and weldless chain.

The Alvarado plant marks a major development in the expansion of the company, adding to manufacturing facilities at York, Pa. and West Burlington, Iowa, and warehouses across the nation.

CAMPBELL CHAIN

CAMPBELL CHAIN *Company*

York, Pa.—W. Burlington, Iowa—Alvarado, Calif.

E. Cambridge, Mass.—Atlanta, Ga.—Dallas, Texas
Chicago, Ill.—Seattle, Wash.—Portland, Ore.
San Francisco and Los Angeles, Calif.

quench or cool loads under atmosphere. Helping visitors will be **H. E. Koch**, president; **E. E. Staples**, vice president; **W. S. Montgomery**, California district manager, **Charlie Potts** and **Walter A. Schwarting.**

HOBART BROTHERS, CO., Troy, Ohio.

Booth 650. Here's a combination gasoline engine — a-c./d-c. welder which should be of interest. Also see a-c. power Tigpak inert gas welding equipment for field operations, a Hustler low-priced a-c. transformer welder, d-c. rectifiers, induction heating and stress relieving equipment.

ILLINOIS TESTING LABORATORIES, INC., Chicago, Ill.

Booth 502. Displaying a host of instruments, such as a Pyrotac, Pyrotroller, continuous indicating dew point monitor, temperature measuring and control instruments, air velocity measuring equipment and dew point measuring apparatus.

INTERNATIONAL NICKEL CO., New York, N. Y.

Booth 360. Displaying extruded clad tubing for chemical and petroleum, 300 M alloy steel sheet for aircraft and Inco hard welding rod for hard-surfacing. Also forged bronze specimens, and applications of nickel, nickel alloys and ductile iron for Western industries.

JONES & LAUGHLIN STEEL CORP., Los Angeles, Calif.

Booth 465. Showing flat rolled stainless intricate finished parts.

KINGWELL BROS., LTD., 457 Minna St., San Francisco, Calif.

Booth 616. See continuous cast bronze bars, a new product this year, and Oilite powdered metal self-lubricating bearings and machine parts, as well as a complete line of bronze bearings. For answers to your questions see **J. E. Nauman**, president, **J. R. Starks**, sales manager, and any of the other seven men present.

KRUSEN WIRE & STEEL CO., Los Angeles, Calif.

Booth 951. Featuring spring steel, spring wire and beryllium copper strip.

LADISH PACIFIC DIV., LADISH CO., 3321 E. Slauson, Los Angeles 58, Calif.

Booth 542. Here you'll find a host of products: forgings for missile, aircraft and nuclear applications in a variety of material specifications including titanium, molybdenum and zirconium; rolled rings in rectangular and contour cross sections; representative pipe fittings from a line of welding fittings, forged flanges and screwed and socket fittings; sanitary fittings, valves, pumps and specialties; corrosion resistant valves in stainless steel, hastelloy, nickel and other alloys; and finally, power, hand hack saw and band saw blades.

LINDE CO., DIV. OF UNION CARBIDE CORP., 22 Battery St., San Francisco 6, Calif.

Booth 490. Electric welding and gas products.

Booth 284. Distributor-sold products.

This 60-ft. display is broken into three groups: electric welding, gas products and distributor-sold products. The welding will include a complete line of equipment and services while featuring a demonstration of the firm's latest development, the Sigmette torch. The gas group displays liquid packages and distribution equipment with a live demonstration of the new electronic tracing unit for oxy-acetylene shape-cutting machines. The final group features the full line of welding and soldering appliances and equipment available to distributors, plus a wide range of cylinders and liquid packages available through the Pacific Region distributors.

LUFKIN RULE CO., 1730 Hess Ave., Saginaw, Mich.

Booth 146. Tools, tools, tools—and Vernier height gages and dial indicators — that's what you'll find here.

MERIT PRODUCTS, INC., 3691 Lenawee Ave., Los Angeles 16, Calif.

Booth 741. If you're concerned with the deburring and polishing of metals don't miss this exhibit of polishing and grinding wheels and sheet and strip polishing machines.

SAVE TIME, MONEY AND MATERIALS

...with these quality products for shop and industry

Rapid Tap
TAPPING FLUID

STOPS TAP BREAKAGE
RELEASES STUCK TAPS
IMPROVES SURFACE FINISH
INCREASES THREAD ACCURACY
LEAVES CLEAN SURFACE

This amazing fluid works wonders in tapping, drilling, reaming, boring, threading, etc. Just a few drops applied to tool as it contacts work breaks down surface tension and adhesions and frees the tool—permitting continued rotation without fear of tool breakage. Keeps tools sharper, too. Effective on most metals and alloys. Non-inflammable and non-explosive.

Sta-Put
DRILL PRESS CLAMPS

The handiest safety device ever offered to the drill press operator. Sta-Put adjusts amazingly fast — holds almost any shaped article secure for easy, accurate drilling. Split collar quickly attaches to drill press column. Swings out of the way when not in use. 5 sizes to fit 14" to 20" drill presses.

Magna-LIFT
FERRO MAGNET

The safe, easy way to lift sheet metal, facing plates, steel panels, etc. Lightweight aluminum-cased magnets, with easy-lift handle, speed handling and lessen worker fatigue. Helps to reduce accidents, too. Load is released by self-breaking cam action handle. Does not damage surface.

CONCRETE-TERMITE
Carbide-Tipped
Multiple-Cutter
ROTARY MASONRY DRILLS
Diameters from 3/16" to 6"
Lengths up to 36"

●

TIP TOP
Carbide-Tipped
Single-Cutter
ROTARY MASONRY DRILLS
Diameters from 11/64" thru 1½"

●

See these outstanding products at the Western Metal Show Booth 1057

RELTON CORPORATION (Formerly TERMITE DRILLS, Inc.)
99 N. LOTUS AVE., P. O. BOX 5546 PASADENA, CALIFORNIA

... for more details, circle No. 46 on Reader Service Postcard

Steel
Lightens your work
Brightens your leisure
Widens your world

Westerners like these new ideas in USS steel

New Muscle for Air Defense. The U. S. policy abroad is supported by the *Thor* ballistic missile. Air Force weapons, like these, built by Douglas, wear jackets of special steels. Equipment for transport, launching, service and supply—depends on USS steel to send these "birds" on their mission.

STEEL FOR EVERY PURPOSE FROM A SINGLE SOURCE

New Protection for Top Secrets. Classified information is guarded and secure after-hours, in tamper-proof steel file cabinets by McDowell & Craig of Norwalk, California. A new Swing-A-Way security locking bar, formed of USS Cold Rolled Sheets, helps keep our national defense secrets safe.

New Versatility for Fixtures. Steel's ideal—for display of any product from hardware to lingerie. These cabinets by M & D Store Fixture Co., City of Industry, California, are formed of USS Cold Rolled Sheets for maximum durability at less-cost-per-foot.

New Setting for Salesmanship. Steel is the style-setter in this handsome building, built by Pascoe Steel Corp., for Tradeway Chevrolet, Manteca, California. Pre-engineered structural systems of USS steel, give architects freedom of design for strong, modern, long-lasting buildings.

USS is a registered trademark

Planning a new product? Plan on steel. Special steels from USS are tailor-made to meet your job requirements. Trained metallurgists are at your service. Manufacturers have only to phone Columbia-Geneva Steel Division of United States Steel.

USS Columbia-Geneva Steel Division of United States Steel

. . . for more details, circle No. 47 on Reader Service Postcard

Behind
Each
Nike-Hercules
is a
Dependable

John BEAN Pump

One of our first lines of defense is the DEW line's Nike-Hercules installations. These installations are usually located in remote, elevated areas where the problem of supplying water for operation personnel is a major factor in maintaining these sites. The John Bean High Pressure Pumps were chosen for this important task because of their rugged dependability and their ability to pump water at high pressure, through long pipe lines extending over a thousand feet in elevation from source to supply.

Pumping Problem?

Send us the details on your "high pressure" pumping problem. We'll be glad to send you complete recommendations.

NEW and BIGGER models
75th ANNIVERSARY
Putting Ideas to Work
fmc
John Bean
®Division
INDUSTRIAL PUMPS
San Jose 1, Calif. Lansing 4, Mich. Dept. WI-6
. . . for more details, circle No. 48

METALLIZING ENGINEERING CO., Westbury, N. Y.

Booth 1134. Look over these automatic control systems, metallizing machines, a powder metal spray gun, and other equipment.

MILLER ELECTRIC MFG. CO., INC., 718 So. Bounds, Appleton, Wis.

Booth 460. Conducting a live demonstration on tungsten inert gas welding as well as displaying a-c. and d-c. welders and combination a-c./d-c. units, gasoline engine driven welder-power plant and spot welders. Of special interest to aircraft men, job shoppers, and manufacturing plant personnel. Look for President **N. C. Miller,** Vice President **C. B. Abel,** Sales Manager **D. R. Warner** and a staff of five.

MILWAUKEE ELECTRIC TOOL CORP., 5350 W. State St., Milwaukee 8, Wis.

Booth 842. Demonstrating the Sawzall Model 414 heavy-duty electric hacksaw, the Pittsburgh lock hammer (Model PLH-1) and heavy-duty sander grinders, polishers and hole shooters.

MINNEAPOLIS-HONEYWELL REGULATOR CO., Wayne & Windrim Ave., Philadelphia 44, Pa.

Booth 322. For better measurement and control of furnaces and ovens consider any of these: constant voltage source for Class 15 plug-in Electr-O-Volt unit, plug-in Electr-O-Line unit, strip chart ElectroniK with plug-in Electr-O-Pulse unit, Pyr-O-Volt controller, magnetic amplifier or ultra-vision flame detector unit. All products are being shown on the West Coast for the first time.

NATIONAL SUPPLY CO., 1524 Border Ave., Torrance, Calif.

Booth 450. Presenting pictorially the firm's facilities and products, such as steel forgings, castings and machined products of high tonnage.

NOBUR MFG. CO., 6860 Farmdale Ave., No. Hollywood, Calif.

Booth 1021. Demonstrating the Intramatic tool for automatic back spotfacing and internal grooving, along with a family of tools designed for rapid deburring and chamfering operations. Aircraft and missile men should see the Intramatic, as it can be used in conjunction with standard drill jigs or employed on turret lathes.

NORTON CO., Worcester 6, Mass.

Booth 744. Demonstrating reinforced resinoid abrasive products for use on portable machines. Also featuring grinding wheels for toolroom, surface, centerless and internal grinding machines and tumbling abrasive for barrel finishing.

NUCLEAR SYSTEMS DIV., BUDD CO., Philadelphia, Pa.

Booth 550. Introducing a Gammascan non-contacting thickness gauge with new console and showing radiography equipment.

OAKITE PRODUCTS, INC., New York, N. Y.

Booth 567. Displaying stripper S-A solvent acid rustripper, Composition 3 for barrel burnishing and steam cleaning with Oakite guns.

PACIFIC SCIENTIFIC CO., Los Angeles, Calif.

Booths 265, 416. Offers a special high-temperature vacuum furnace suitable for laboratory research into cermets, graphite and other high temperature materials for inspection. Other items of special interest to the scientifically inclined include a tensile testing machine, micro hardness testers and a small double-edged high temperature brazing furnace.

PACIFIC TUBE CO., Los Angeles, Calif.

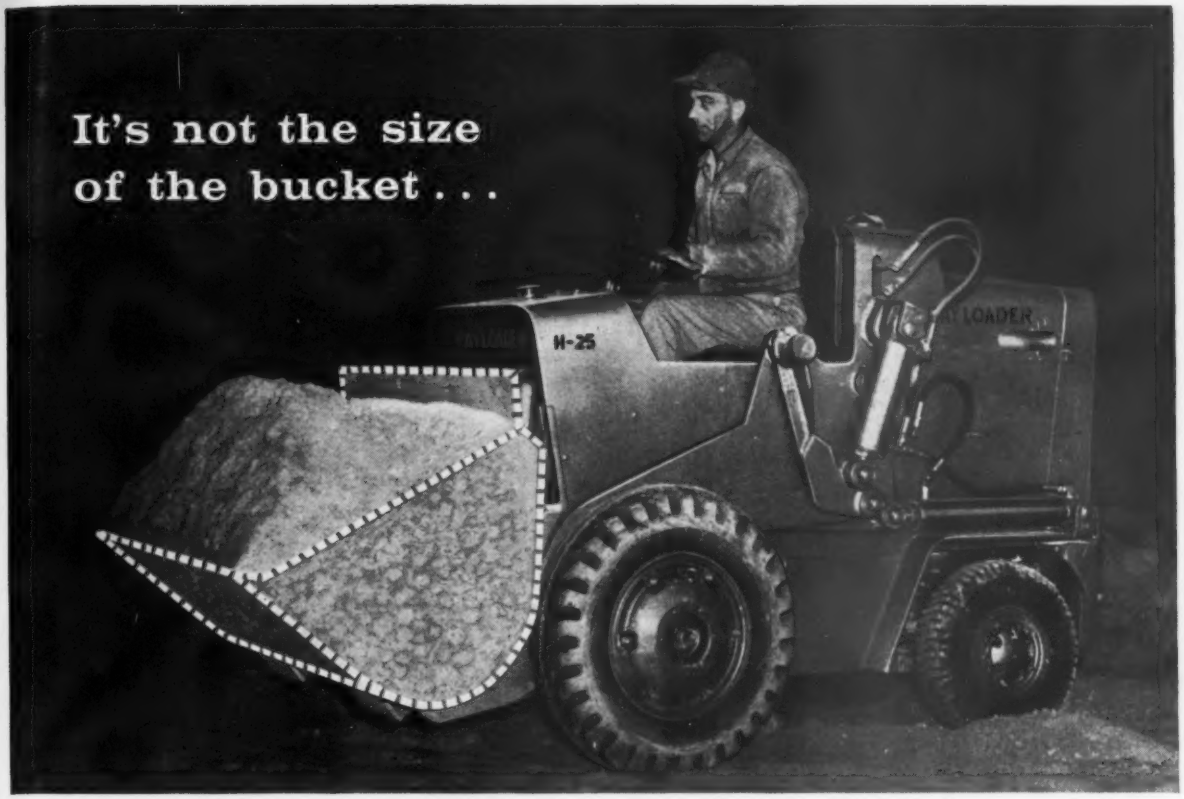
Booth 233. Displaying tubing and cold finished bars.

RELTON CORP., 99 No. Lotus Ave., Pasadena, Calif.

Booth 1057. Meet Rapid Tap, a tapping fluid and not a cutting oil, for drilling, tapping, reaming, and so on.

RIGIDIZED METALS CORP., 658 Ohio St., Buffalo 3, N. Y.

Booth 674. Will stress design strengthening qualities imparted to plain metal by the company's process, displaying new finishes available for metals including stainless steel, aluminum and carbon steel. Applicable to such fields as architecture, aircraft and surface transportation.



. . . It's the weight of the load that measures tractor-shovel capacity!

More pounds per load . . . Buying a tractor-shovel on the basis of bucket volume, without knowing the carry capacity IN POUNDS of the unit, is putting the cart before the horse. You may be getting too much bucket, or not enough, for handling *your* materials most efficiently.

Buying on the basis of lifting capacity can be equally misleading since any tractor-shovel can lift much more than it can carry. However, it is the number of pounds which can be moved safely at normal speeds, in relation to the weight of the material to be handled, which determines the proper bucket size.

The carry capacity of the new model H-25 "PAY-LOADER" is 2,500 lbs. This is equal to 40% of the total machine weight and represents a new high in Capacity-to-Weight ratio for a unit of this class.

It is easy to select the proper bucket size which will enable you to safely move the largest load of *your* materials with an H-25 by referring to the table below.

FOR MATERIAL WEIGHING	BUCKET SIZE (S. A. E. RATED)	H-25 CARRY CAPACITY
up to 90# per cu. ft.	1 cu. yd.	2,500 lbs.
up to 105# per cu. ft.	⅞ cu. yd.	2,500 lbs.
up to 125# per cu. ft.	20 cu. ft.	2,500 lbs.
up to 155# per cu. ft.	16 cu. ft.	2,500 lbs.
up to 190# per cu. ft.	13 cu. ft.	2,500 lbs.

More loads per shift . . . The new H-25 "PAY-LOADER" not only handles a big load for its size and weight, but has the speed, maneuverability and ease of operation which permits it to move more loads per shift. Features which make this extra productivity possible are full-reversing, power-shift transmission with two speeds forward and two reverse; torque-converter drive; power-steering; power-transfer differential which automatically shifts more torque to the wheel with the best traction, and fast, powerful hydraulic bucket control.

Your "PAYLOADER" distributor will be glad to show you why you get more for your money in the model H-25 and other "PAYLOADER" units. Ask him about Hough Purchase and Lease Plans too. If you are interested in more information on the H-25, write to The Frank G. Hough Co., 889 Sunnyside Ave., Libertyville, Illinois.

Modern Materials Handling Equipment

THE FRANK G. HOUGH CO.

889 Sunnyside Ave., Libertyville, Illinois

SUBSIDIARY—INTERNATIONAL HARVESTER COMPANY

Send data on "PAYLOADER" models

☐ 4-wheel drive ☐ 2-wheel drive

Name.....

Title.....

Company.....

Street.....

City.....Zone.....State.....

11-A-1

. . . for more details, circle No. 49 on Reader Service Postcard

JOSEPH T. RYERSON & SON, INC., Box 8000-A. Chicago 80, Ill.

Booth 643. A diversified line of free machining products including fast machining steels of carbon, alloy and stainless types, and aluminum rod and cast aluminum tooling plate. Visitors can watch one type of steel tubing being machined, and receive data and case study information. Rounding out the display will be free machining plastic bar and plate stock, which is widely used for applications in which resistance to corrosion is a prime factor.

SMITH WELDING EQUIPMENT CORP., Minneapolis, Minn.

Booth 677. Exhibiting a gas control unit; soldering, brazing and heating equipment; propane cutting tips; and oxy-acetylene equipment for welding, cutting, heating and brazing.

SPRAYKING, INC., Los Angeles, Calif.

Showing the waterwash spraybath, along with Fostoria infrared oven equipment and flammable liquid storage cabinet.

STACKBIN CORP., 1079 Main St., Pawtucket, R. I.

Booth 972. Pause to check the display of steel bins and racks for storage that could save you time and labor in a small parts area.

TRENT TUBE CO., East Troy, Wis.

Booth 354. Showing off welded stainless steel and high alloy tubing and pipe, particularly for those in aircraft, missile, mechanical, pressure, ornamental or dairy pursuits.

UNION CARBIDE METALS CO., DIVISION OF UNION CARBIDE CORP., New York, N. Y.

Booths 284, 382. Stop to view the display of metals: Chromium, columbium, silicon, tantalum, tungsten, vanadium, and other metallic exhibits.

U. S. ELECTRICAL MOTORS, INC., Los Angeles, Calif.

Booth 479. See right angle syncrogear motors, varidyne motors and other electric motors for industry.

This picture shows welding with a Victor torch sold in 1914—45 years ago. Aside from minor repairs, the torch is still going strong.

VICTOR EQUIPMENT CO., 844 Folsom St., San Francisco 7, Calif.

Booth 654. Hard facing alloy rods utilizing new semi-automatic welder with automatic hard facing wire will keynote the display of gas welding and cutting equipment.

WALKER-TURNER DIV., ROCKWELL MANUFACTURING CO., 400 N. Lexington Ave., Pittsburgh 8, Pa.

Booth 281. Nine drill presses, metal-cutting band saws and other tools will be ready for operation. If you're interested in machine tools that can be moved around the shop or production line, and still provide accuracy and performance required in most operations, check these.

WALL COLMONOY CORP., 19345 John R. St., Detroit 3, Mich.

Booth 515. Hard-surfacing alloys, a semi-automatic welder and a full line of brazing alloys for high temperature service and allied products, featuring recently announced Nicrocoat process for coating sheet metal parts with a protective layer.

WESTINGHOUSE ELECTRIC CORP., Pittsburgh, Pa.

Booth 692. Displaying alloy metal products, bar strip forgings and castings. And also motors, gearmotors and X-ray testing equipment.

peak production

CALLS FOR THE BEST IN CONVEYOR BELTING

TON TEX

Choose Ton-Tex HEAVY DUTY for tough conveyor jobs

HEAVY DUTY is a rugged Ton-Tex belt unmatched for handling heavy, bulky loads at top speeds. Moisture, dryness, heat and acid fumes will not shorten life of belt. HEAVY DUTY conveyor belting is made of specially treated, tightly woven plies of cotton duck. It is made in five weights and can be vulcanized endless. Ideal for live roller conveyors. Let our engineers help you choose the right belt for your job. Write for 20-page Conveyor Belting catalog today.

Other TON TEX belts for conveyor jobs

STANDARD for light, non-abrasive, grease-free products, cans, bottles, packages.

OIL-EX resists oil, grease, water, steam, heat, acids. A tough belt that withstands severe abrasion.

PERMA-CLEAT belts will carry products up steep inclines better and faster.

TON-TEX CORPORATION, GRAND RAPIDS 2, MICH.
1180 AUZERAIS AVENUE, SAN JOSE 26, CALIFORNIA

TON-TEX CONVEYOR AND TRANSMISSION BELTING

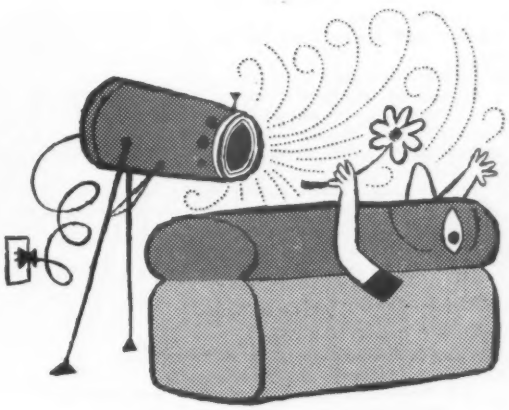
TON TEX

. . . for more details, circle No. 50 on Reader Service Postcard

Can these new electronic marvels save you money?

The new techniques in electronics are limitless . . . are helping many businessmen make better products at lower cost. Here are four of the newest which may help you:

Electronic "detective" hunts transient metals. Powerful, new metal detectors now "frisk" plastics, wood, rubber, textiles for transient metals—and *find* them—even when deeply embedded.



Electronic "gun" keeps bread fresh for months. Smaller, lighter generators of electron beams now destroy bacteria, moulds, yeast — sterilizing foods and drugs without changing flavor or appearance.

"Silent sound" scrubs tiny component parts. Improved ultrasonic generators now clean tiny component parts in *seconds,* where cleaning by hand has been costly, even impossible.

TV gives "superman sight" to industry. New, small TV cameras let operators peer through walls, around corners, under ground—even watch highly dangerous operations in complete safety.

New techniques in electronics exist in almost every field. We'll help you get information on techniques that apply in your field.

Pacific Gas and Electric Company

. . . for more details, circle No. 51 on Reader Service Postcard

Technical sessions

(Sessions will be held at Ambassador Hotel)

American Society for Metals

Theme: Progress in Metals Technology During the Sixth Decade

Monday, March 16

Selection Criteria—Effects of Service Experience and Changes in Performance Requirements

Morning Session

Chairman: **G. W. Papen,** California Division, Lockheed Aircraft Corp.
Co-Chairman: **E. F. Green,** Rocketdyne Division, North American Aviation

9:00 Aircraft Airframes
E. A. Green, Department Manager, Production Engineering, California Division, Lockheed Aircraft Corporation

9:45 Aircraft Power Plants
D. E. Hanink, Chief Metallurgist, Allison Division, General Motors Corp.

10:30 Solid Propellant Missile Airframes
L. E. Zwissler, Head, Applied Studies, Polaris Development Engineering Division, Aerojet-General Corp.

11:15 Liquid Propellant Missile Power Plants
P. R. Vogt, Assistant Chief Engineer, Rocketdyne Division, North American Aviation

Afternoon Session

Chairman: **R. L. Graves,** Fluor Corp.
Co-Chairman: **C. A. Brown,** The Ralph M. Parsons Co.

2:00 Petroleum Industry
G. R. Prescott, Research Engineer, C. F. Braun and Co.

2:45 Chemical Industry
G. A. Nelson, Staff Metallurgist, Shell Development Co.

3:30 Power Generation Equipment
G. B. Grable, Chief Metallurgist, Bechtel Corp.

Tuesday, March 17

Effects of Advances in Mill Practices on Material Characteristics

Morning Session

Chairman: **H. A. Curwen,** Earle M. Jorgensen Company
Co-Chairman: **W. R. Patterson,** National Supply

9:00 Panel Discussion on Vacuum and Protective Atmosphere Melting of Stainless Steels and Super Alloys
W. W. Dyrkacz, Quality Control Manager, Watervliet Works, Allegheny Ludlum Steel Corp.

9:20 Of Stainless Steels and Super Alloys
D. E. Nulk, Senior Project Engineer, Design Metallurgy, Jet Division, Thompson Ramo Wooldridge Inc.

9:40 Of Low Alloy Steels
A. Nagy, Research Associate, and **F. M. Richmond,** Manager, Materials Research, Universal-Cyclops Steel Corp.

10:00 Of Lithium-Aluminum Alloys
E. H. Spuhler, Manager, Aero-Space Section, Sales Development Division, Aluminum Company of America

10:20 Discussion
Co-Chairman: **C. W. Ashcombe,** Kaiser Steel Corp.

11:00 Sandwich Rolling
E. Van Meter, Service Metallurgist, Steel Operating Division, United States Steel Corp.

11:20 Close Tolerance Rolling
V. W. Whitmer, Assistant Chief Metallurgist, and **T. E. Perry,** Product Metallurgist, Central Alloy District, Republic Steel

11:40 Tapered Sheet and Plate
K. F. Thornton, Assistant Manager, Sales Development Division, Aluminum Company of America

Afternoon Session

Effects of Advances in Intermediate Fabrication Techniques on Material Characteristics

Co-Chairmen: **J. Hall,** Precision Castings, Inc., and **L. Hofstetter,** Brumley Donaldson Co.

2:00 Panel Discussion on Improvements in Quality Control of Castings
W. A. Bailey, Metallurgical Engineer, Santa Monica Division, Douglas Aircraft Co.

2:20 **F. R. Drahos,** Senior Metallurgist, Byron Jackson Pumps

2:40 **F. C. Kroft,** Works Manager, and **G. A. Fritzlen,** Technical Director, Haynes-Stellite Company

3:00 **W. R. Roser,** Engineer (Metallurgist), NorAir Division, Northrop

3:20 Discussion
Chairman: **W. McCue,** Steel Improvement and Forge Corp.

4:00 Precision Forgings
D. Honebrink, Research Engineer, Metals Unit, Boeing Airplane

4:30 Compressively Stress-Relieved Forgings
R. Smallman-Tew, Chief Metallurgist, AVRO Aircraft Ltd.

Wednesday, March 18

Morning Session

Effects of Advances in Fabrication Techniques

Chairman: **W. C. Anderson,** North American Aviation, Inc.
Co-Chairman: **C. P. King,** Marquardt Aircraft Corp.

9:00 Forum Discussion on Steel Heat Treating-Carbon Control
Dr. L. Schapiro, Chief Metallurgist, Santa Monica Division, Douglas Aircraft Co.
N. K. Koebel, Manager, Heat Treating Furnace Division, Lindberg Engineering Co.
O. E. Cullen, Manager, Research & Development, Surface Combustion Co.
W. R. Varney, Superintendent and Chief Metallurgist, Calmec
R. H. Lundquist, Vice President, California-Doran Heat Treating
M. Tiktinsky, Materials and Process Development Engineer, Lockheed Aircraft Corp.
J. C. White, Test Engineer, North American Aviation, Inc.

10:30 Panel Discussion on Reduction of Warpage By Creep Forming and Die Quenching of Non-Ferrous Alloys
J. Soja, Senior Research Engineer, North American Aviation, Inc.

10:50 By Die Quenching of Steel
T. R. Bradley, Chief Metallurgist, Rohr Aircraft Co.

11:05 By Thermal Cycling of Aluminum Alloys
H. N. Hill, Chief, Engineering Design Section, Alcoa Research

11:45 Discussion

Afternoon Session

Co-Chairmen: **L. L. Gilbert,** Aerojet-General Corp., and **R. R. Meredith,** Missile Division Laboratory, North American Aviation, Inc.

2:00 General Problems Concerning Ultra High Strength Steel Thin-Wall Pressure Vessels
D. F. Gunder, Engineering Consultant

2:30 Panel Discussion on Welding Problems Concerning Ultra High Strength Steel Thin-Wall Pressure Vessels
A. J. Williams, Senior Welding Engineer, Consolidated Western Steel Division, United States Steel Corp.

2:40 **G. B. Pritchett,** Resident Chief Metallurgist, Research Division, Solar Aircraft Co.

2:50 **W. Tenner,** Head, Materials and Process, Solid Rocket Plant, Aerojet-General Corp.

3:00 **E. P. Owen,** Senior Engineer, Firestone Tire and Rubber Co.

3:10 Discussion

3:30 Panel Discussion on Forming
Chairman: **F. Spiegl,** Titanium Fabricators, Inc.
By Explosive Methods
S. R. Carpenter, Producibility Supervisor, San Diego Division Convair

3:55 **A. H. Petersen,** Group Engineer, Producibility Methods, California Division, Lockheed Aircraft Corp.

4:20 By Hydro Spinning
J. N. Heater, Assistant Machine Tool Manager, Harron, Pickard and McCone

4:35 Discussion

Thursday, March 19

Fabrication and Reliability Problems Associated With Specific Alloys

Morning Session

Chairman: **C. H. Avery,** NorAir Division, Northrop Corp.
Co-Chairman: **M. M. Tilley,** Kaiser Aluminum and Chemical Sales Corp.

9:00 Forum Discussion on Hydrogen Embrittlement of Ultra High Strength Steels
Dr. R. P. Frohmberg, Chief, Production Development Laboratory, Rocketdyne Division, North American Aviation, Inc.
P. W. Kloeris, Metallurgist, Santa Monica Division, Douglas Aircraft Co.
G. G. Wald, Research Specialist, California Division, Lockheed
B. F. Brown, Head, Physical Metallurgy Branch, Metallurgy Division, Naval Research Laboratory
A. M. Adair, Task Scientist, Metallurgy Research Branch, Aeronautical Research Laboratory, Wright Air Development Center
C. E. Moeller, Chief Metallurgist, Menasco Manufacturing Co.

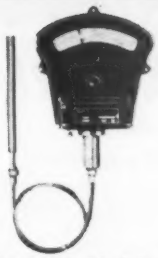
10:00 Upgrading Via Specifications
K. F. Thornton, Assistant Manager, Sales Development Division, and **J. F. Faulkner,** Manager, Aircraft Missile Section, Aluminum Company of America

10:40 Magnesium-Thorium Alloys
R. E. Bockrath, West Coast Magnesium Technical Service Engineer, Dow Chemical Corp.

11:20 Titanium and Titanium Alloys
W. S. Lyman, Consultant, and **C. T. Olofson,** Principal Engineer, Battelle Memorial Institute

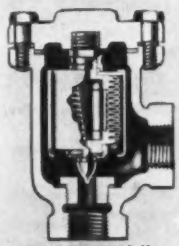
Sarco Type 21 Self-Powered Temperature Regulator

Sarco Type 24-30 Self-Powered Pilot Operated Temperature Regulator

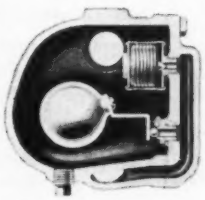


Sarco Type LSI Electric Indicating Temperature Controller

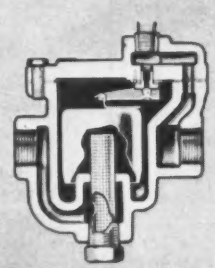
Sarco Thermo-Dynamic Steam Trap



Sarco Thermostatic Steam Trap

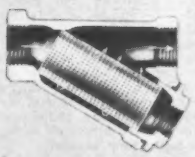


Sarco Float-Thermostatic Steam Trap



Sarco Inverted Bucket Steam Trap

Sarco Liquid Expansion Steam Trap



Sarco Pipe Line Strainer

These SARCO products also are available locally

Air Eliminators
Balancing Fittings
Cooling Controls
Compressed Air Traps
Dial Thermometers
Condensate and Vacuum Pumps
Lift Traps
Electric Thermostats and Pressure Switches
Finned-Tube and Baseboard Radiation
Water Blenders
Motor-Operated Valves
Radiator Traps
Radiator Valves
Room Thermostats
Solenoid Valves
Weather-Compensated Heating Control Systems

Depend on your SARCO sales representative to supply you with this complete

SARCO QUALITY LINE

Through your nearest Sarco sales representative, you can get every product in the complete line of Sarco traps, temperature controls and steam specialties. For your convenience, the complete list of Western States Sarco sales representatives is printed here, arranged by states. 7173-B

These are your SARCO Western States sales representatives

ARIZONA
Scottsdale
A. C. Baechlin

CALIFORNIA
Los Angeles
T. H. Creears Corp.
San Francisco
Sarco Company, Inc.

COLORADO
Denver
Equipment Specialties Co.

IDAHO
Boise
Mechanical Equipment & Engineering Inc.

MONTANA
Billings
Lefler Engineering Sales

NEW MEXICO
Albuquerque
Technical Service Co.

OREGON
Portland
R. H. Brown & Co.

UTAH
Salt Lake City
Williams, Gritton & Wilde

WASHINGTON
Seattle
E. H. Norton
Spokane
John L. Harvey Co.

SARCO
COMPANY, INC.
635 Madison Ave., New York 22, N. Y.

. . . for more details, circle No. 52 on Reader Service Postcard

CUT HANDLING COSTS • • • STOCK MORE IN LESS SPACE

Low-Cost Flexible Stackbin System
Saves Space, Time and Labor

Stackbin®-Stackrack® Combinations are the ideal way to minimize parts, tools, materials handling. Stackbins are portable containers, so you can carry materials throughout your process without transferring contents to any other container. Stored in Stackracks, every Stackbin is instantly accessible when it's needed. You never disturb another bin. Hopper fronts on Stackbins provide visibility and accessibility to the materials. Available in 7 sizes, Stackbin-Stackrack Combinations make most efficient use of floor space. With inexpensive Adapters any small units can be stacked on larger units. Related items can be kept in one place. Individual units lock together: no tools, no setup time needed.

All Stackbin Products Sold Direct

SEE US AT BOOTH 972

WESTERN METAL EXPOSITION • Pan Pacific Auditorium
Los Angeles, Calif., **MARCH 16-20th**

STACKBIN CORPORATION, 1137 Main St., Pawtucket, R. I.

Mfgd. and sold in Canada exclusively by Wickware-Stackbin, Ltd., Perth

STACKBIN SYSTEM
"Stacked and Still Accessible"

. . . for more details, circle No. 53 on Reader Service Postcard

This Exclusive SURETY **GLOVE COMBINATION SOLVES MORE HAND PROTECTION PROBLEMS**

than any other we know

SURESEAL
(HYCAR)
TURN-CUFF INDUSTRIAL GLOVES

Tests prove Sureseal's amazing long life—ten times and more wear than other materials. Since Surety makes gloves from all materials you may be sure of test impartiality. Adding Surety's famous safety feature, Turn-Cuffs, the barrier to dangerous liquids, provides the maximum hand safety and comfort to make willing hands and willing workers. Ask your jobber or write Dept. WI, The Surety Rubber Co., Carrollton, Ohio.

TEST
at our expense
Send for slide rule showing gloves best to resist chemicals, acids, oils, solvents, etc. Tell us your glove need, too . . . we'll send sample pair.

Western Sales Rep: The Macintosh Co. 3030 Bridgeway, Sausalito, Calif.

. . . for more details, circle No. 54 on Reader Service Postcard

Afternoon Session

Chairman: **F. Keith Lampson,** Allegheny-Ludlum Steel Corp.
Co-Chairman: **W. R. Rohde,** Armco Steel Corp.

2:00 17-7PH and AM 350 Stainless Steels
C. M. Walker, Pilotless Aircraft Division, Boeing Airplane Co.

2:45 431 Stainless Steel
C. C. Angstadt, Metallurgy Group Leader, El Segundo Division, Douglas Aircraft Co.

3:30 301 and AM 355 Stainless Steels
Dr. M. Watter, Director of Airframe Research, Budd Company

4:00 A286 High Temperature Alloy
L. J. Hull, Chief Metallurgist, Ryan Aeronautical Co.

American Welding Society

Monday, March 16

2:00 p.m. Afternoon Session

Chairman: **Francis Stevenson,** Aerojet-General Corp., Sacramento, Calif

Welding Techniques of Low Alloy High Strength Tools in the Missile Industry
G. F. Harkins, Chief Process Engineer, Solar Aircraft Company, San Diego, Calif.

Welding of Thin Gauge Aluminum for the Aircraft Industry
R. J. Longerbeam, Process Engineer, Royal Industries, Inc.

Tuesday, March 17

Morning Session

Chairman: **M. C. Bonar,** Manager, Operations, Vinnell Steel Co.

Automatic Unionarc Applications on Bridge Fabrication
C. A. Zwissler, Welding Engineer, Kaiser Steel Corporation.

New Semi-Automatic Welding of Structural Steel
Leighton W. Johnson, Chief Engineer, Gunderson Bros. Corp., Portland.

Recent Advances in Welding Power
R. Henderson, Metal and Thermit Company, Oakland, Calif.

Tungsten-Arc Cutting of Austenitic Stainless Steel
G. A. Conner, Welding Engineer, General Electric Company, Richland, Wash.

2:00 p.m. Afternoon Session

Brazing Panel:
Chairman: **John Ross,** Engelhard Industries

Brazing Fluxes
Stan Cross, Engelhard Industries, Los Angeles

High Temperature Brazing
Harry Lewis, Pyromet Company

Wednesday, March 18

9:00 a.m. Morning Session

Chairman: **Samuel E. Hickman,** Chief Welding Engineer, Rheem Manufacturing Co., Downey, Calif.

Tape-Controlled Heliarc Spot Welding
R. L. Hackman, Development Engineer, Linde Company, Newark, N.J.

Welding Applications on Thor Ground Support Equipment
C. B. Smith, Assistant Chief Materials & Process Engineer and **P. W. Hookey,** Welding Engineer, Douglas Aircraft Company.

Evaluation of 17-4 and PH 15-7 Mo Precipitation Hardening Stainless Steel Weldments
Harold Smallen, Senior Engineer, Northrop.

A Practical Design Approach to Resistance Weld Peeling Loads
Wm. P. Kraus, Senior Research Engineer, North American Aviation.

2:00 p.m. Afternoon Session

(Joint Session with American Society for Metals on Pressure Vessels)
Co-Chairman: **L. L. Gilbert,** Aerojet-General Corp.
Co-Chairman: **R. R. Meredith,** Missile Division Laboratory, North American Aviation, Inc.

UHS Thin-Wall Pressure Vessels—Statement of the Problem
Dwight Gunder, Engineering Consultant

Welding of High Strength Ferrous Alloys
Panel Members:
A. J. Williams — G. B. Pritchett — Walter Tenner — E. P. Owen

Forming

Chairman: **Fred Spiegl,** Titanium Fabricators, Inc.

Explosive Forming

S. R. Carpenter, Convair, San Diego
A. H. Peterson, Lockheed Aircraft Corporation

Hydro Spinning

J. N. Hester

Thursday, March 19

9:00 a.m. Morning Session

Chairman: **R. C. Wiley,** California State Polytechnic College.

Problem Areas in the Heliarc Welding of a Highly Stressed Pressure Vessel

Wm. Sponheimer, Project Engineer, Welding and **P. C. Simmons,** Project Engineer Metallurgist, Hughes Aircraft Company, Tucson, Ariz.

Weldability of Thorium Magnesium Alloys

Harlan Meredith, Vice President, Airline Welding & Engineering.

2:00 p.m. Afternoon Session

Chairman: **R. C. Hayes,** Whittier, Calif.

Quality Control of Spotwelding Shear Strength

W. A. Soward, Quality Control Supervisor, North American Aviation.

Experimental Design in Welding

J. E. Hurzeler, Welding Group Leader, North American Aviation, Inc.

Fusion Welder, Continuous Recertification

Lyle C. Curran, Director, Quality Control for U.S.A.F., North American Aviation, Inc.

46,200 Welds Per Second—Speed Sandwich Assembly

C. A. van Pappelendam and **C. C. King,** Missile Division, North American Aviation, Inc., Downey, Calif.

American Society for Metals "Explosive Forming"

Thursday, March 19

Session I
9:00 a.m., Boulevard Room

(a) Why Explosive Forming
(b) Materials Formable

Chairman: **John E. Dorn,** Professor of Physical Metallurgy, University of California, Berkeley

Session II
2:00 p.m., Boulevard Room

(a) Energy Sources
(b) Energy Transmittal Media

Chairman: **John S. Rinehart,** Director of Mining Research Lab., Colorado School of Mines, Golden, Colo.

A. Wickesser, Jr., Manufacturing Engineering, Grumman Aircraft Engineering Corp., Bethpage, Long Island, N. Y.

Friday, March 20

Session III
9:00 a.m., Boulevard Room

Dies and Die Materials

Chairman: **John Pearson,** Head, Dynamics of Solids Branch, U. S. Naval Ordnance Test Station, China Lake, Calif.

Session IV
2:00 p.m., Boulevard Room

(a) Production Applications of Explosive Forming
(b) Other Applications of Principles

Chairman: **Keith A. Wilhelm,** Consulting Engineer, Encino, Calif.

OTHER TECHNICAL SESSIONS:

"Recent Advances in the Physics of Metals"—A program organized and sponsored by the Southern California Section, AIME, March 16-20, Ambassador Hotel.

Society for Nondestructive Testing—Fourth Western States Meeting. March 16-20, Ambassador Hotel.

TO SEE AND LEARN ABOUT
THE LATEST INDUSTRIAL LABORATORY
INSTRUMENTS • CHEMICALS • APPARATUS

VISIT BOOTH 726

at the Western Metal Show

MARCH 16-20—LOS ANGELES

HARSHAW SCIENTIFIC

DIVISION OF THE HARSHAW CHEMICAL CO.
CLEVELAND 6, OHIO

IN LOS ANGELES: 3237 SO. GARFIELD AVE.
TELEPHONE RAYMOND 3-3161

CINCINNATI ★ CLEVELAND ★ DETROIT ★ HOUSTON ★ LOS ANGELES ★ PHILADELHIA

Sales Offices in:

Amarillo, Texas • Atlanta, Georgia • Baton Rouge, La. • Buffalo, N. Y. • Hastings-On-Hudson, N. Y. • Oakland, Calif. • Pittsburgh, Pa.

. . . for more details, circle No. 55 on Reader Service Postcard

HELPFUL LITERATURE for the West's plant operating executives

FOR YOUR FREE COPIES, circle appropriate key numbers on postcard, p.85

Data on space-saving, less costly V-belt drives

A completely new line of v-belt drives that are smaller, cost less, weigh less and require less space than conventional v-belt drives is the subject of this 44-page manual. Illustrated with photographs and engineering drawings, the bulletin explains unique construction features of Dyna-V sheaves and v-belts, enabling them to deliver up to three times as much horsepower in a given space. Tables of pre-engineered drives make this an easy-to-use manual for plant design engineers and other users with power transmission problems. Other tables give horsepower capacities, belt speeds, center distances, sheave diameters, etc. Photographs illustrate easy-on, easy-off characteristics of Taper-Lock bushings. **Dodge Mfg. Corp.**

. . . for your copy, circle No. 300

File-size folder describes automatic power scoop

How bulk materials can be unloaded from box cars in half the time usually required and with one operator is detailed in a new file size folder. It tells of various applications for the automatic safety power scoop, together with data about a new electronic radio-transmitter for immediate stop and go, proving greater safety for operator. Complete specifications, and a reproduction of the blueprint of this unit are included. **Alden Equipment Div., Amercon Corp.** **. . . for your copy, circle No. 301**

Technical data on new, low-cost metal finishes

New, low-cost metal finishes that are fast drying and durable, based on Parlon chlorinated rubber, are now possible through the availability of a new, short-oil alkyd, according to this technical data bulletin. Both the Parlon and the new resin, Cellolyn 604, are made by Hercules. Although Parlon is widely used in the formulation of traffic paints and other specialized finishes, its use in the metal-finishing field has been somewhat restricted because only the slower drying medium and long-oil types of alkyd resins could be used. Tests indicate that product finishes containing Cellolyn 604 and Parlon give tack-free drying times of 30 minutes. **Hercules Powder Co.**

. . . for your copy, circle No. 302

Grinding wheel catalog lists all sizes, shapes, prices

This illustrated grinding wheel catalog describes a complete range of sizes, shapes with prices for every industrial application. The 12-page manual includes vitrified, resinoid and rubber bonds in cut-off, straight, recessed and plate-mounted wheels. Recommended applications are also given. Important in the line are Chicago Flex and BR (Break Resistant) wheels for portable grinding, weld and metal fabrication, finishing, portable cement grinding, notching and plastic grooving. **Chicago Wheel and Manufacturing Co.**

. . . for your copy, circle No. 303

Data on dyes for use with Creslan acrylic fiber

This 51-page brochure — the first of its kind—deals with procedures for applying various classes of dyes to Creslan, a new acrylic fiber. It shows fastness properties of this firm's dyes when applied to Creslan, including results of tests conducted for washing, acid and alkaline perspiration, rubbing and light fastness. Characterized by excellent textile properties and high affinity for dyestuffs, the fiber is used in knitwear such as sweaters, suits, socks and underwear, and for knit blankets, carpets and industrial applications. **Allied Chemical, National Aniline Division.**

. . . for your copy, circle No. 304

8-page brochure describes new air hoist line

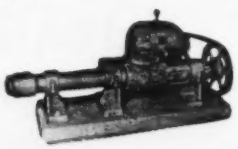
Complete specifications, operating data and accessory information on a new line of air hoists are described in this comprehensive eight-page brochure. All critical dimensions of importance for installing the new hoists are detailed on a single, easy-to-read page of schematic drawings. Individual photographs explain features of various operating components. One page of the booklet is devoted to a description of accessory equipment applicable to the air hoists. The new hoist line is built in capacities from 1,000 to 2,000 lbs. in hook or trolley types. Push button pendant or pull cable controls are available in all models. — **Yale Materials Handling Div., Yale & Towne Mfg. Co.**

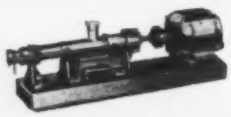
. . . for your copy, circle No. 305

With Moyno Pumps Material Is Moved!

Where you want it! When you want it!

NO TYPE LIMITATIONS. The Moyno principle knows no type limitations. Liquids, abrasives, solids in suspension—a Moyno pumps all with equal ease. There's only one moving part, a helical rotor turning in a double helical stator—no delicate vanes, no reciprocating parts, no valves. That's why a Moyno is always on the job where pumping was a problem.





HOW ABOUT YOU? These amazing pumps have solved hundreds of tough pumping problems. If you're interested in good pumping, investigate the advantages Robbins & Myers Moyno Pumps have to offer. They'll stand up where other pumps fail, delivering positive pressures, without pulsation. There's a Moyno for every purpose. Chances are they're just what you're looking for. Ask for Free Bulletins: #34-WI,, Food Pumps or #30C-WI, Industrial Pumps.

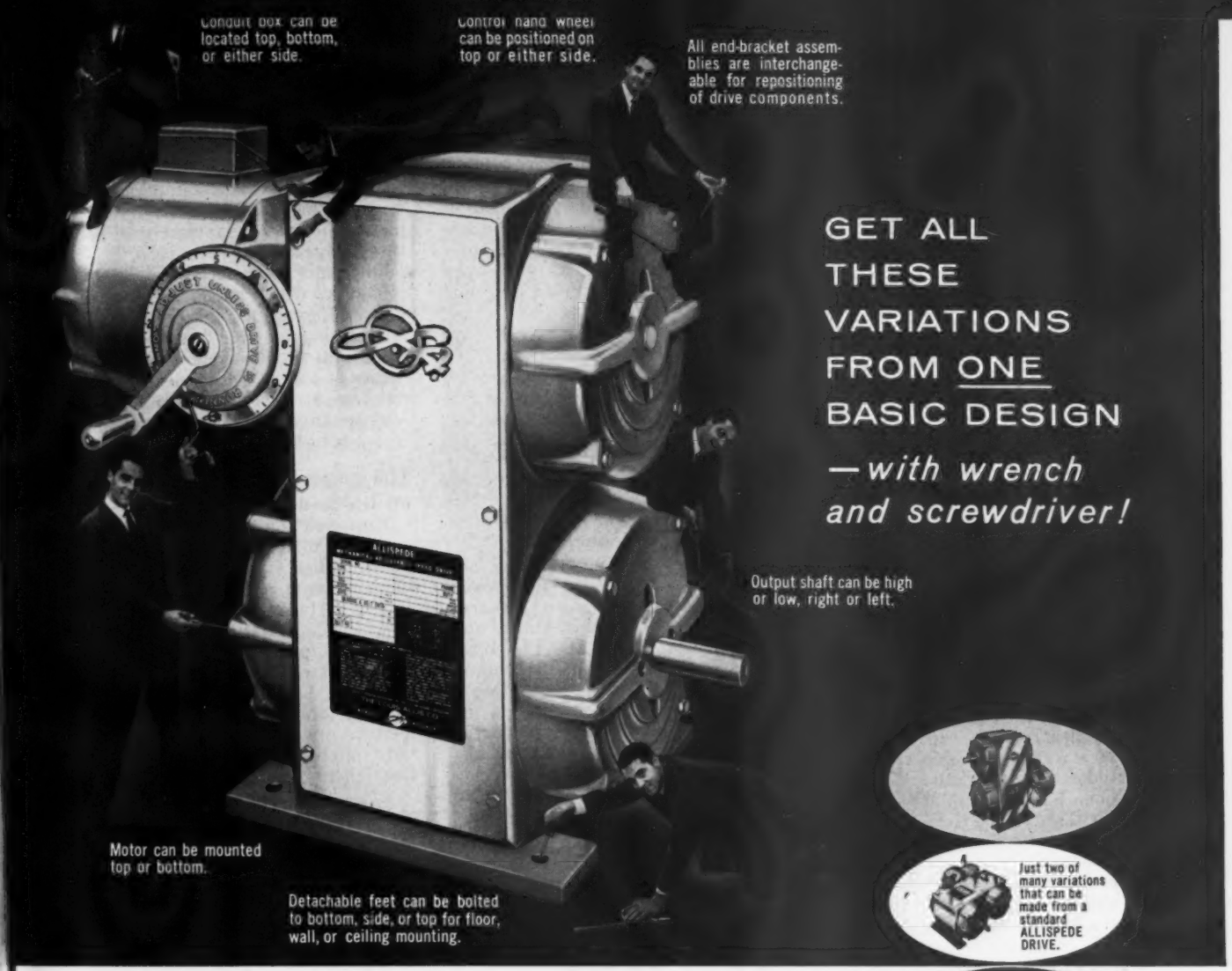
Call "Fernholtz" First for Complete Information

FERNHOLTZ MACHINERY CO.

8468-W Melrose Place
LOS ANGELES 46, CALIFORNIA
Telephone OLive 3-2360

. . . for more details, circle No. 56 on Reader Service Postcard

. . . for more details, adv. opp. page, circle No. 57 on Reader Service Postcard


Conduit box can be located top, bottom, or either side.
Control hand wheel can be positioned on top or either side.
All end-bracket assemblies are interchangeable for repositioning of drive components.
GET ALL THESE VARIATIONS FROM ONE BASIC DESIGN
—with wrench and screwdriver!
Output shaft can be high or low, right or left.
Motor can be mounted top or bottom.
Detachable feet can be bolted to bottom, side, or top for floor, wall, or ceiling mounting.
Just two of many variations that can be made from a standard ALLISPEDE DRIVE.

The ALLISPEDE* DRIVE gives you complete field versatility!

It's the most flexible and precise mechanical adjustable speed drive made . . . and the only one that can be fully adapted in the field!

The *all-new* ALLISPEDE DRIVE is the answer to any motor application that calls for low-cost adjustable speed. It permits smooth, easy speed adjustment — and maintains it exactly. Its modern design permits unusual field-flexibility — lets the user change the unit *any time* to suit his various requirements.

The a-c ALLISPEDE DRIVE is the *only* drive that can be fully adapted in the field by the user. The basic unit goes together like building-blocks . . . feet, end brackets, control hand wheel, conduit box, and output shaft can be relocated in minutes to fit existing space limitations. The same unit can be changed from an upright to a horizontal drive for floor, wall or ceiling mounting. And all you need is a wrench and screwdriver!

Superior design improves drive efficiency and extends service life. The four bearings equally distribute belt load, increasing bearing and belt life. Movable discs slide smoothly on internally-lubricated splined shafts — won't stick in place or wear. Belt changes are faster — never disturb the dial or adjustment mechanism. Rugged cast-iron housing with plated steel covers shields drive against dirt and corrosion . . . integral rotor fan cools the motor and force-ventilates the drive housing to extend bearing life. Oversize cartridge bearings are pressed on shaft and lubricated at the factory. Corrosion-resistant stainless steel nameplates diagram proper motor connection, specify bearing sizes, and carry complete instructions for operation and lubrication.

The ALLISPEDE DRIVE can be supplied with in-line or right-angle integral gears, brake and tachometer. Sizes from 1 to 20 HP with speed variations up to 8:1. Electrical and mechanical modifications are available to meet special requirements for any application.

Contact your Louis Allis District Office or Distributor for complete information and engineering assistance. Or write for Bulletin 3300, The Louis Allis Co., 438 E. Stewart Street, Milwaukee 1, Wisconsin.

*ALLISPEDE is a trademark of The Louis Allis Co.

A50-118

LOUIS ALLIS

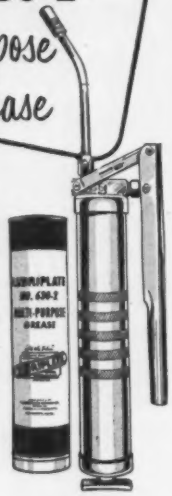
MANUFACTURER OF ELECTRIC MOTORS AND ADJUSTABLE SPEED DRIVES

BURLINGAME • DENVER • LOS ANGELES • PHOENIX • PORTLAND • SALT LAKE CITY • SEATTLE

LUBRIPLATE
No. 630-2
Multi-Purpose Grease

ALSO PACKED IN

CONVENIENT GREASE GUN CARTRIDGES



Lubriplate No. 630-2 is a high temperature, extreme pressure, water-repellent, grease type lubricant. Ideal for the general lubrication of Industrial, Automotive, Construction, Farm and Marine Equipment. Lubriplate Grease Gun Cartridges provide an easy, quick, economical means of application. Prevent the waste and mess of hand filling. Packed 10 Cartridges in a handy carrying carton.

REGARDLESS OF THE SIZE AND TYPE OF YOUR MACHINERY, LUBRIPLATE LUBRICANTS WILL IMPROVE ITS OPERATION AND REDUCE MAINTENANCE

For nearest LUBRIPLATE distributor see Classified Telephone Directory. Write for free "LUBRIPLATE DATA BOOK"... a valuable treatise on lubrication. LUBRIPLATE DIVISION, Fiske Brothers Refining Company, Newark 5, N. J. or Toledo 5, Ohio.

. . . for more details, circle No. 58

1959 guide for easy selection of motors

Nine major factors in selection of polyphase, single phase and direct current mtors—1/20th to 400 hp.—are detailed in the opening pages of this 1959 motor application guide. Designed to make motor selection easy, this 16-page manual, expanded this year, contains motor selection charts that describe typical motor driven equipment, show starting and running torques for such equipment, load characteristics, type of motor to use on the equipment, starting currents, speeds, capacity, etc. **Century Electric Co.**

. . . for your copy, circle No. 306

Latest Dow catalog edition covers 375 chemicals

Latest edition of Dow's products catalog, this 38-page book describes properties and uses of 375 industrial, pharmaceutical and agricultural chemicals. The 1958-59 issue is the fourth annual booklet issued by Dow. Containing a new cover and new features, the catalog is a ready reference for Dow's broad range of chemicals. **The Dow Chemical Co.**

. . . for your copy, circle No. 307

4-pager about carburetor type desuperheater

A carburetor type desuperheater capable of being controlled to supply steam at a temperature within plus or minus 5 deg. F of plant requirements is described in this 4-page Bulletin No. 1056. The publication explains the method of control which produces this result and gives the range of control attainable. Also described are structural details, system arrangements of control components, and mechanical specifications. **Copes Vulcan Division, Blaw-Knox Co.**

. . . for your copy, circle No. 308

163 pages of facts on bolts, nuts, rivets

Designed for your convenience —both as to size and data arrangement— this spiral-bound, well-indexed catalog offers 163 pages full of facts on industrial fasteners. A wide variety of bolts, nuts, rivets, spikes, studs and special products are described in tables that give specifications, prices, weight, containers, etc. The fourteen tab-indexed sections include both photographs and drawings. **Bethlehem Steel Co.**

. . . for your copy, circle No. 309

Perhaps you weren't thinking of a DRILL PRESS

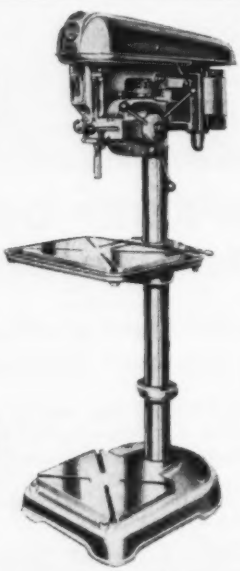
Well, in that case, Haven Machinery & Supply Co. has all kinds of other

MACHINE TOOLS...

- Sheldon lathes
- U.S. Burke milling machines
- Marvel hacksaws
- Wells metal bandsaws
- Delta metalworking machines
- Many other lines

INDUSTRIAL SUPPLIES...

- Disston metal bands, hacksaw blades, files
- Standard cutting tools
- Simonds grinding wheels
- Nicholson files and burrs
- 3M abrasives
- Jacobs chucks and arbors



New Delta 20" Drill Press . . . designed for production tooling. A heavy duty drill press, built to last. Massive construction for continuous precision operation. Big capacity for general shop or factory use. Ask about Delta's many quality "extras" that make for easy, trouble-free operation.

See them all at the 5 HAVEN branches:

HAVEN
MACHINERY & SUPPLY CO.

SAN FRANCISCO	OAKLAND	
1072 Howard St.	950 E. 14th St.	
HE 1-6212	TE 4-9110	
SACRAMENTO	**SAN JOSE**	**FRESNO**
21st & J Sts.	859 W. Julian St.	2450 Inyo St.
GI 3-2003	CY 5-1344	AM 4-5009

. . . for more details, circle No. 59 on Reader Service Postcard

Data on welding equipment and industrial regulators

Illustrated with cross section drawings, this 24-page brochure evaluates 50 important design features found in oxy-acetylene welding and cutting equipment and industrial regulators produced by 19 leading manufacturers. It contains 12 pages of especial interest to welding department and plant maintenance superintendents and 12 pages on regulators for engineers who work with air-activated equipment or commercial gases in a wide range of industrial applications. **Modern Engineering Co.**

. . . for your copy, circle No. 310

Bulletin simplifies ordering of metal-enclosed bus

Designed to aid in selection of metal-enclosed bus for utility and industrial use, this comprehensive 20-page bulletin gives ratings and construction details on a complete line of isolated phase and nonsegregated phase bus—large-size conductor for high-voltage high-current electrical loads—and bus auxiliary equipment. Isolated phase bus is available in voltage ratings from 4.16 through 34.5 kv to carry up to 20,000 amp. Nonsegregated phase bus comes in voltage ratings of from 600 volts to 13.8 kv to carry from 1,200 to 5,000 amp. A six-page section of the bulletin simplifies planning and ordering of isolated phase bus, explaining how to plan a bus system both electrically and physically, including a sample specification. **I-T-E Circuit Breaker Company.**

. . . for your copy, circle No. 311

User Report details dollar savings in M-H case history

That material handling equipment, properly used, is an investment that begins to yield good returns as soon as it is put into use is the point presented in a series of User Reports showing actual dollar savings effected through the proper application of Raymond Corp. narrow aisle trucks. In a new report that describes the problem and solution of a case history involving handling of long dies and fixtures, the successful results of the application are enumerated and actual dollar savings are totalled in a summary. Photographs are used to illustrate the publication, User Report No. 21. **The Raymond Corp.**

. . . for your copy, circle No. 312

LONG BEACH, CALIFORNIA, Offers Industry:

AMERICA'S MOST MODERN PORT

. . . . and a World of

Foreign Markets and Raw Materials

Transport costs are a prime factor that can bring your industry Westward to meet competition. So, too, local transportation governs market expansion and raw material buying. World markets, as well as domestic ones, will deliver new customers. World-wide raw materials will be at your beck and call via the Port of Long Beach, and costs for your foreign trading will be at low ocean shipping rates.

Remember, Long Beach, unlike most port cities, is compact, close to the heart of its harbor. Connecting railways, freeways and airways speed transportation.

There are other reasons for locating your new plant in the Long Beach Harbor area. Included are rich market area, large labor pool, lowest electric rates, low-cost gas, abundant water supply, profit-making climate, better living, low taxes, available raw materials, and economic stability.

NEW: FREE FACTS: Write, or attach coupon to your letterhead. Inquiries are kept in confidence, of course.

CHAMBER OF COMMERCE, 121- A LINDEN AVE.
LONG BEACH, CALIFORNIA

Name: _____

☐ Please send color brochure on Industrial Long Beach, and newspaper "The Plant Locater" Title: _____

Firm: _____

☐ Send your quarterly Port news magazine, "Harbor Highlights" Address: _____

State & City: _____

Where climate turns the wheels of industry for greater profits

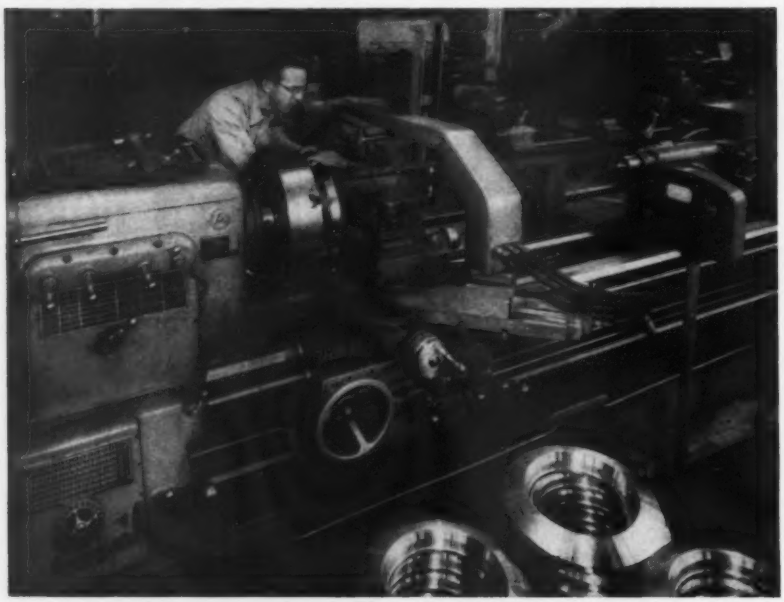
LONG BEACH, CALIFORNIA

. . . for more details, circle No. 60 on Reader Service Postcard

All about machines to use in bearing-surface finishing

In this eight-page catalog that illustrates and describes a complete line of bearing-surface finishing machines for straight shafts, crankshafts, and camshafts, you'll find data on models A, B, HD, and SFA lapping machines; models A, B, HD, DER, and SER fillet-rolling machines; and models SF and SFB machines which can lap, fillet roll, or roll burnish. The model SF is a recently-introduced manually loaded machine for straight shafts, crankshafts, or camshafts, while SFB is a just-announced automatic counterpart of the SF, equipped with loading and unloading devices so the machine can be used in integrated production lines. All lapping machines in the line utilize coated-abrasive cloth. Both fillet rolling and roll burnishing are used to provide high surface finish, but the primary purpose of fillet rolling is creation of compressive surface stresses to extend fatigue life of the workpiece. **The Foote-Burt Co., Schraner Division.**

. . . **for your copy, circle No. 313**



Turnings you get FROM Johnson Gear

are uniformly accurate; delivery is prompt and you spend less money because this Monarch's "seeing eye" stylus follows a precise template – piece after piece. You can get a wide range of work, too – from ring gear blanks to forming rolls.

This fast, accurate Monarch tracer lathe is just one example of the high quality equipment we have installed for

GEAR CUTTING • MACHINING • GRINDING • BROACHING • KEYSEATING

Spur
Herringbone
Worm
Helical
Straight &
Spiral Bevel
Sprockets
Racks

8J

For quotations on your work call THornwall 5-7376

JOHNSON GEAR
& MANUFACTURING CO., LTD.
8TH AND PARKER STREETS • BERKELEY 10, CALIFORNIA
MAKERS OF FINE GEARS SINCE 1904

. . . for more details, circle No. 61 on Reader Service Postcard

Climatized vertical motors described in bulletin

Details about all-weather vertical hollow shaft motors in ratings of 1 to 30 hp. are given in a recently-released bulletin. These climatized motors provide indoor and unprotected outdoor service on shallow or deep-well turbine pump applications for irrigation, petroleum product handling, chemical pumping, power plant condenser cooling and other industrial installations. The motor design offers great compactness for space savings and handling ease, and uses the most advanced insulating materials, that give optimum resistance to moisture and chemical contaminants, and have high mechanical strength. **The Louis Allis Co.**

. . . **for your copy, circle No. 314**

Book cites advantages of a complete finishing system

In industries where finishing constitutes a major production operation, a complete system is a must — not only from a standpoint of the product, but also from that of production, according to this 12-page recent publication. An efficient finishing system must be planned carefully with respect to products processed, type of finish applied — engineered and co-ordinated to produce the finest finish obtainable at the lowest per unit cost. The booklet emphasizes these points with many illustrations, featuring typical custom installations in operation in automotive, appliance and many other industrial plants. Plus data on finishing, the booklet gives you alternative ideas for improving or building new installations involving drying and baking of all kinds, dust, fume and fog control. **The R. C. Mahon Co.**

. . . **for your copy, circle No. 315**

16-page handbook describes plastic piping systems

This 16-page handbook deals with the technology of plastic piping systems—plastics used in piping systems, installation and coupling methods, standards for plastic pipe and temperature and working pressure chart for Chemtrol valves. It features a table showing effects of 280 chemicals on five different plastics used in Chemtrol valves. **Chemtrol.**

. . . **for your copy, circle No. 316**

12 pages on aluminum usage for heat exchangers

Advantages of aluminum usage in heat-exchanger fabrications are fully described in a new 12-page publication, "Reynolds Aluminum for Heat Exchangers." Its 16 pages of charts, pictures and technical information needed by the heating engineer, fabricator and industrial purchaser, covers aluminum heat transfer rates, temperature properties, tensile strengths pressures and dimensional tolerances. Charts provide fingertip information on aluminum stress values, working pressures, thermal expansion and conductivity and friction factors. Aluminum's lower cost, corrosion resistance, maximum heat transfer, light weight and resistance to fouling are explained, together with information on how these advantages can be applied in design and construction. **Reynolds Metals Company.**

. . . for your copy, circle No. 317

Here's how bag ejector eliminates manual handling

How manual lifting of filled bags is completely eliminated by a new automatic bag ejector that is part of a mill feed packing system is described in this four-page, two-color bulletin. This ejector, which automatically transfers filled bags from a bag table onto a bag sewing conveyor belt, makes it possible for one man to handle weighing, packing and sewing operations. It may be applied to the firm's existing packers as well as new machines. The bulletin, #2549A, discusses components of the system, including a scale, a newly-developed pneumatic auger packer, the automatic bag ejector and a bag sewing conveyor. How the system works is clearly demonstrated in three photographs, an engineering diagram and text material. **Richardson Scale Co.**

. . . for your copy, circle No. 318

Brochure describes line of packaged water chillers

In this 16-page illustrated brochure you can read about a redesigned line of packaged water chillers for air conditioning and industrial cooling applications. The new catalog outlines advantages of the redesigned units, discusses and illustrates outstanding mechanical specifications. A series of schematic wiring diagrams shows control panel wiring, control circuit wiring for city water operation and cooling tower operation. Also illustrated are pneumatic control connections. Selection data covers the full range of sizes, with selection charts listing such factors as leaving water temperature, chiller cooling range and condensing temperature. **American Standard, Industrial Div., American Radiator & Standard Corp.**

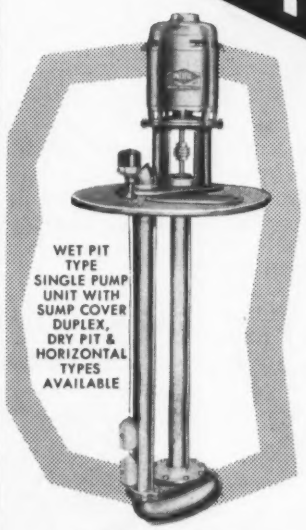
. . . for your copy, circle No. 319

20-page catalog covers Quick-Seal couplings line

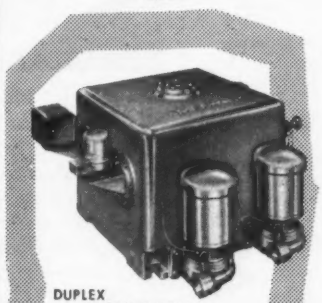
This illustrated 20-page color catalog gives details about an extensive line of couplings for hydraulic and pneumatic applications. The bulletin discusses all three types of the firm's couplings —straight-through, single check-valve, and double check-valve, available in many sizes and alloys to meet any operating requirement. Cross-section drawings point out major features of the component, which is leak-proof at all operating pressures; may be coupled or uncoupled in one second—and without special tools. All couplings are interchangeable in the same sizes. **Titeflex, Inc.**

. . . for your copy, circle No. 320

PACIFIC



WET PIT TYPE SINGLE PUMP UNIT WITH SUMP COVER DUPLEX, DRY PIT & HORIZONTAL TYPES AVAILABLE



DUPLEX PACKAGE UNIT AVAILABLE WITH 30, 45, OR 60 GALLON CAST IRON RECEIVERS

Features PUMPS FOR INDUSTRY

NON-CLOG PUMPS

THOUSANDS OF PACIFIC NON-CLOG pump installations handle industrial wastes, heavy fluids, liquids containing solids, refuse and pulp. Available in special metals for handling products of canneries, breweries, food, and other processing plants. Send for Bulletins 1850 series.

CONDENSATE AND BOILER FEED UNITS

WIDE RANGE OF SIZES AND TYPES conform to latest ASVHE recommendations, for vertical, elevated or floor level installation. ReturnZall package units (illustrated) are complete package units, with square cast-iron receiver, bronze fitted centrifugal pumps (type GR), standard heavy-duty NEMA motor and float controls. For complete information send for Series 1700 bulletins.

OTHER PACIFIC INDUSTRIAL PUMPS

- Sump pumps
- Circulators
- Fire pumps
- Proportioning pumps
- Diaphragm pumps
- Centrifugal pumps
- PACO Turbine-type pumps
- Rotary pumps
- Horizontally split case centrifugal pumps
- Contractors' self priming pumps

PACIFIC PACIFIC PUMPING CO.

Manufacturers & Distributors of Pumps for Every Service

OAKLAND · PORTLAND · SEATTLE · LOS ANGELES

MAIN OFFICE 9201 SAN LEANDRO STREET · OAKLAND 3, CALIFORNIA

. . . for more details, circle No. 62 on Reader Service Postcard

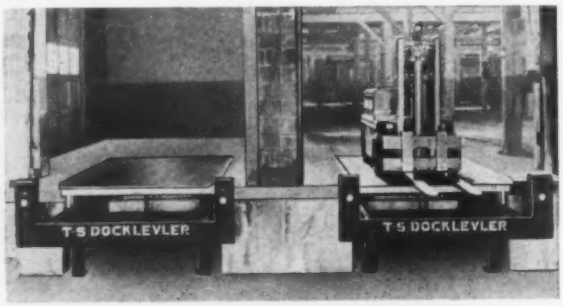
NEW EQUIPMENT for Western plant operation production, and maintenance

USE RIP-OUT POSTCARD, page 85, for more information on products described

RECESS MODELS OF DOCKLEVLER

. . . for automatic loading

Designed for fast safe loading and unloading with forklift and platform trucks, the Docklevler has full floating, self-adjusting features to auto-



matically maintain a perfect bridge between truck-bed and dock as height of truck varies with changing load. Chassis of unit is mounted to the wall and rugged steel frames are welded into place, eliminating the use of piers or legs. Available in standard recess models, semi-package and package units, in sizes 6 x 6 ft., 6 x 8 ft. and 6 x 10 ft., it also comes in sizes tailored to meet special loading dock requirements. Manufactured by **T & S Equipment Co.**, Albion, Mich., it is distributed in Northern California by **Perin Co., Inc.**

. . . for more details, circle No. 350

NEW STRIPPER ADDITIVE

. . . boosts power of alkaline solutions

A new additive, designed to enable alkaline paint stripping solutions to remove difficult synthetic finishes, is known as Oakite Stripper Additive No. 4. A solvent, it converts a narrow-range stripping solution into a wide-range solution capable of removing epoxy, acrylic, and similar tough finishes. Use of this additive, according to the manufacturer, makes it possible to salvage rejects economically, and to remove paint build-up from hooks, spray booth filters, etc. The new material is added to alkaline solutions in the range of 10 to 20% by volume. Resulting solutions are said to cost only one-quarter to one-third as much as solvent strippers of equal effectiveness. **Oakite Products.**

. . . for more details, circle No. 351

NEW TUMBLING SHAPE

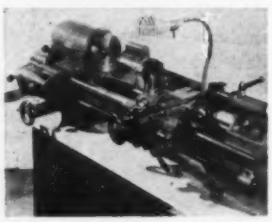
. . . solves barrel finishing problems

Three major barrel finishing problems—discoloration, impingement and media fracture—have been virtually eliminated with a new shaped media called the "Honite" brand C-R Tumbling Shape. It is a truncated triangular pyramid with sharp edges and acute angles that work into radii not reached by other types of media. Cutting speed of the new shape—composed of aluminum oxide mineral anchored in a 3M-developed binder—is up to two and one-half times faster than existing aluminum oxide chips, and reported as much as 12 times faster than natural stone media. Because of its speed and concentrated cutting action, the media is specifically intended for stock removal. Plus faster cut, the new shape offers a significant reduction in contamination of workpiece surfaces by metallic and mineral residue, producing a lightness or color which is not possible to duplicate in a single run with any other type of media, according to the manufacturer. **Minnesota Mining and Manufacturing Co.**

. . . for more details, circle No. 352

LOW COST METAL LATHE

. . . variable speed drive, large capacity



An all-new 10-in. metal cutting lathe, featuring a variable-speed drive and ¾-in. collet capacity never before available on a metal lathe of this size, has been introduced. Designed to fill the need for a low-cost lathe to do heavy-work in commercial metalworking shops, plant maintenance shops, tool rooms and other industrial operations, the new lathe is compact, modern looking and easy to operate. The smooth, quiet direct drive position can be used extensively—for many thread pitches and heavy cutting usually done in gear drive on other lathes. The ¾-in. collet capacity, larger than any other lathe in its class, is obtained by using a 4-C style collet with a 15/16 hole through the spindle. **Rockwell Mfg. Co., Delta Tool Div.** . . . for more details, circle No. 353

INDUSTRIAL PROPERTIES
Warehouses · Buildings · Lofts · Plants · Factory Sites—Appraisals

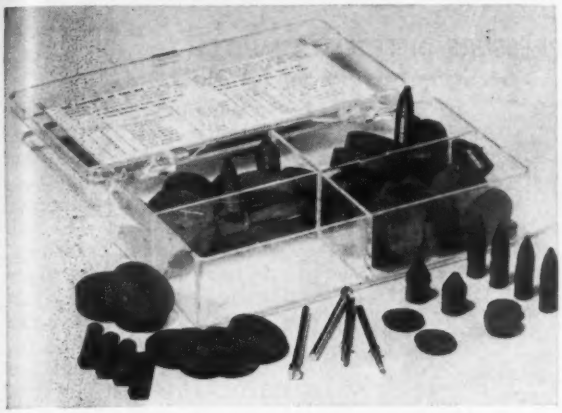
SALES • LEASES
Complete Coverage Up-to-the-Minute Lists

COLDWELL, BANKER & COMPANY, REALTORS

57 Sutter Street, SAN FRANCISCO 4, Phone SUtter 1-5420
425 - 15th Street, OAKLAND 12, Phone GLencourt 1-7300
900 Wilshire Blvd., LOS ANGELES 17, Phone MAdison 6-0611
1009 Jay Street, SACRAMENTO 14, Phone GIlbert 1-1407
3018 Central Avenue, PHOENIX, ARIZONA, Phone AMherst 6-8445

. . . for more details, circle No. 63 on Reader Service Postcard

RUBBERIZED ABRASIVE KIT
. . . for tool and die makers



This tool and die makers kit has been developed to introduce rubberized abrasives to tool and die makers. Although use of rubberized abrasives is increasing, their advantages in solving sensitive deburring, smoothing and polishing problems are not widely known. From more than 350 shapes and sizes the company makes, the firm has selected wheels and points most useful to tool, die and mold makers and component parts manufacturers. Packaged in a plastic box, compartmented for fast selection, the kit contains 80 wheels and points equally assorted in four grit textures (coarse-C, medium-M, fine-F, extra fine-XF), and four mandrels for ⅛" chuck. **Cratex Manufacturing Company.**

. . . for more details, circle No. 354

GAR-BRO WHEELS
FOR ALL INDUSTRIAL APPLICATIONS

26
TYPES & SIZES

WHEEL TYPES: Drop Center, Lug Base, Disc, Demountable.

WHEEL DIAMETERS: 21", 20", 18", 17", 16", 15", 12", 10", 8", 6".

BEARINGS: Tapered roller, straight roller or ball.

TIRES: Pneumatic or cushion—all standard sizes.

Available with or without tires.
Write for catalog.

GAR-BRO WHEEL COMPANY
Division of Garlinghouse Bros.
2415 E. Washington Blvd., Los Angeles 21, Calif.

. . . for more details, circle No. 65 on Reader Service Postcard

RIVETS and NAILS
TO "AN" SPECIFICATIONS

Immediate Delivery on Many Sizes
Air Force Approved Facilities

Economically cold headed in MONEL
INCONEL • STAINLESS • COPPER • STEEL

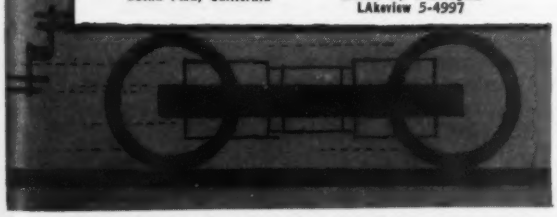
MANUFACTURERS SINCE 1850

JOHN **Hassall** INC.
P. O. Box 2186
Westbury, Long Island, New York

Hassall

CALIFORNIA, ARIZONA
H. Blake Smith
P.O. Box 277, Lawrence 2-1805
Buena Park, California

WASHINGTON, OREGON
D. H. Landin & Co.
5501 University Way
Seattle 5, Washington
LAkeview 5-4997



. . . for more details, circle No. 64 on Reader Service Postcard

Here's a Valuable Shortcut

Stripping pigmented paints
—with no need for pickling before repainting

Oakite Rustripper saves time in paint shops by doing *complete* stripping in one operation. Eliminates extra pickling (and neutralizing) to remove metallic pigments, phosphate coatings and rust that prevent successful repainting.

FREE For your copy of *"Here's the best shortcut in the field of organic finishing"* write Oakite Products, Inc., 1001 E. First St., Los Angeles 12, or 681 Market St., San Francisco 5, Calif.

Technical Service Representatives in Principal Cities of U.S. and Canada

OAKITE
SCIENCE

Export Division Cable Address: Oakite

. . . for more details, circle No. 66 on Reader Service Postcard

UPENDERS IN TANDEM
. . . simplifies automatic stacking

A simple and unique method of automatic stacking utilizes two upenders in tandem. The first upender receives loads, one at a time, and stands them up on the second upender. When five loads have been accumulated the second upender sets up the loads, stacked five high. The stack can be delivered to a conveyor (as shown in the picture) or can be picked up by an industrial truck. Units are controlled by a system of electric eyes. The units will handle almost any load that can stand on end. The loads shown are too soft and irregular to be handled with clamps. **Lamson Coporation.**

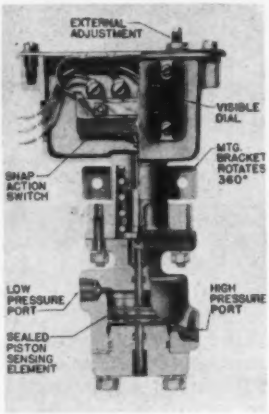
. . . for more details, circle No. 355

INSTANTANEOUS HEATERS
. . . with steam inlet arrangement

This pre-engineered, fully standardized line of instantaneous heaters features an extra-large steam entrance area beyond the tube bundle, that prevents tube damage by impingement, prolonging tube life, according to the manufacturer. Designated Type W-100, the units are of compact, simplified design, with removable, pull-thru tube bundles. Available in 128 sizes with two and four pass arrangements, nominal tube lengths up to 10 ft. and shell diameters through 20 in., the heaters are readily available for practically every water heating requirement. **American-Standard, Industrial Division.**

. . . for more details, circle No. 356

PRESSURE DIFFERENCE SWITCH
. . . particularly suitable for filters



This new pressure difference switch particularly suitable for filter installation, is constructed to sense a difference from 5 psi. to 140 psi. between two pressures. When a filter becomes clogged, the switch senses the pressure difference across the filter's inlet and outlet and actuates a warning circuit. A sealed piston sensing element actuates an electric circuit upon increasing or decreasing of predetermined pressure difference. It is applicable to oil systems ranging from 50 to 6000 psi. working pressure. A high proof pressure rating of 9000 psi. gives protection against damage from sudden surges and shock loads. Field setting is made simple by an external adjustment screw and visible dial. Fixed actuation value of the new switch (pressure difference change to reset) is from 5 to 15 psi. depending on the working range of the system. **Barksdale Valves.**

. . . for more details, circle No. 357

we're the other* Goodyear

CUSTOM RUBBER PRODUCTS *for Industry*

Lining tanks with rubber or plastic as a protection against the corrosive action of strong acids, alkali and industrial chemicals is one of many services we perform for Western industry.

Goodyear Rubber Co., 2400 Third St.
Box W3, San Francisco, California.

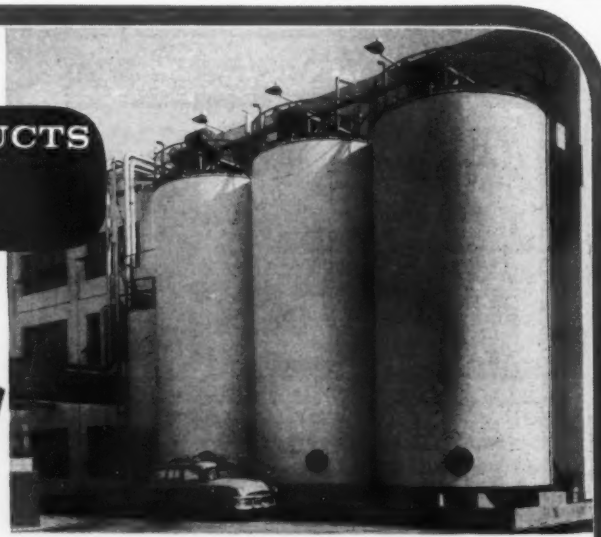
Please send me your new brochure.
"RUBBER PRODUCTS FOR INDUSTRY"

NAME_____

FIRM NAME_____

STREET_____

CITY_____ STATE_____



Huge field-erected tanks are lined on the job by our especially-trained field crews.

We also manufacture to specification all types of custom rubber products—using both natural and man-made rubber. At the present time we are serving the aviation, electronic, automotive, irrigation, petroleum, food, marine and lumber industries. Please write for our 16 page brochure.

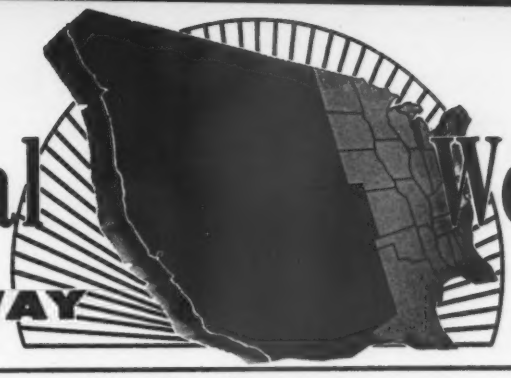
* *Matter of fact . . . the original! Established 1872, we have no connection with the firm that manufactures automobile tires.*

GOODYEAR RUBBER COMPANY

2400 THIRD STREET • SAN FRANCISCO, CALIFORNIA

. . . for more details, circle No. 67 on Reader Service Postcard

The Industrial West



ON ITS WAY

plants • production • distribution • personnel

Western Gear Increases Plans for Expansion

LYNWOOD, CALIF.—As part of its plant-wide expansion program, Western Gear Corp. has announced plans for constructing a new reliability and quality assurance building for its Precision Products Division. The new facility, to cost some $350,000, will be located on the firm's 26-acre property here and is scheduled for completion by summer.

The new air-conditioned and dust-free structures will include a vibrationless, temperature controlled precision standards department for ultra-precise checking of equipment.

Other phases of Western Gear's expansion and improvement program include enlarging heat treat facilities, expansion of the main factory building and completion of a dust-free precision assembly department by the end of year.

Precision Products Division, one of six, is engaged in missile and rocket programs.

Continental Can to Build Plant at Olympia, Wash.

OLYMPIA, WASH.—Continental Can Co. has revealed plans for construction of a 200,000-sq. ft. plant near here for manufacture of cans. Primary product will be beer cans and the expected capacity will be in excess of 200 million a year.

Eventual employment of 100 persons is expected at the facility, located on a 20-acre site on Fones Road.

AiResearch Expands Office, Factory Facilities in Phoenix

PHOENIX — Construction has begun on a 10,000-sq. ft. factory expansion for AiResearch Manufacturing Co., which recently completed an office expansion of similar size. Both are adjacent to the firm's pneumatic control building at 402 S. 36th St.

According to *Jack O'Brien*, division manager of the Garrett Corp. firm, new product advancement from the development to production stage will result in hiring some 100 additional machinists and engineers.

Fruehauf Trailer to Build $2,000,000 Facility

ONTARIO, CALIF.—Construction on a $2,000,000 manufacturing plant has been started by Fruehauf Trailer Co. in the Vina Vista district near here. Completion of the 150,000 sq. ft. facility — Fruehauf's largest in the West—is scheduled for June, with production to start in the fall.

Plans call for the plant to have two assembly lines for vans, one for flat-bed trailers and a fourth for other types of trailers. Capacity is scheduled for 200 trailers monthly. When in full production expected employment is 500.

West's Most Modern Chain Plant Begins Production

ALVARADO, CALIF. — The West's first complete chain-making facilities—equipped to produce every type of welded and weldless chain and assemblies—are now in operation at the new 130,000 sq. ft. Campbell Chain Co. plant here.

Said to be the most modern of its kind in the country, the plant is a one-story building that provides all advantages of completely integrated straight-line production. Equipment includes the latest in heat-treating and annealing furnaces and the most modern wire-drawing, forming and welding machinery. The factory has complete facilities for metallurgical and product testing.

The plant will enable fast delivery to industrial, commercial and automotive chain users in the West and will also supply Campbell warehouses in Portland, Seattle and Los Angeles.

When the plant was opened in mid-February, the South San Francisco office was closed and all stock moved to new location, where the address is P. O. Box 336, phone GReenleaf 1-2420.

Zellerbach Expands Camas Lab

CAMAS, WASH.—Expansion of its development laboratory here with a 6,000 sq. ft. addition has been announced by Crown Zellerbach Corp. The expansion will provide space for mechanical repair and design sections. Presently the laboratory houses a small scale pulp mill, an experimental paper machine and a 24-in. coater.

Lebanite Products Starts Operations in Los Angeles

LOS ANGELES — Lebanite Products Co., a subsidiary of Cascades Plywood Corp., Portland, has begun operations in its new plant at 2700 Carrier Ave., where the company offers a board material components custom manufacturing service.

The new facility provides 14,000 sq. ft. of warehousing space, plus 16,000 sq. ft. of operating area. The earthquake-proof building with tilt-up concrete walls topped by a solid plywood sheathing roof, has no windows.

The new plant produces component parts fabricated from Lebanite hardboard and Lebanex panel, which are products of Cascade Plywood, and from other board materials specified by customers. Equipment includes a suction type dust removal system and machinery to permit sawing and bandsawing, edge-shaping, drilling, boring, die-punching, etc. to customers' specifications.

The new plant is staffed by *Lowell Dunham, Jr.*, manager; *Harlan Faccou*, superintendent, and *Caryl Knudsen*, secretary.

Moffet Engineering Gets New Plant in Berkeley

BERKELEY, CALIF. — Moffet Engineering, Inc., recently-purchased subsidiary of Gate City Steel, Inc., of Denver, is moving into a 70,000-sq. ft. plant at 940 Dwight Way. The new facility, according to *Will C. Hall*, Moffet president, has a spur track into the building, and is admirably suited for the firm's production of heavy duty industrial powerhouse and gantry cranes.

Production at the new facility is scheduled for late May or June, when the complete change-over from present quarters at 579 Cleveland Ave., Albany, has been accomplished.

Gate City Steel, which is a subsidiary of Husky Oil Co., also has steel fabricating and warehousing plants in Boise, Ida., and Omaha, Neb.

Factory Branch in Phoenix

PHOENIX — A factory branch office-warehouse of Kirsch Co., Sturgis, Mich., manufacturer of drapery hardware has been opened at 2335 W. Holy. The facility represents a $45,000 investment, the company said.

Strapping tape
245 lbs. STRONG!

Shuford's
SHURTAPE® GS-63
Woven glass reinforced strapping tape

Extra high strength, extra low stretch, extra long life . . . three big features of this pressure-sensitive tape.
Woven glass reinforcing provides strength in two directions . . . and with Mylar® laminated to the backing, splitting, drying out and cracking are prevented.
Extremely high tear resistance insures against damage. High gloss finish.
Use Shuford's SHURTAPE GS-63 for unitizing, palletizing and sealing Kraft cartons and bags . . . also ideal for bundling, protecting, holding, and reinforcing applications.

Ask for free sample from your
ZELLERBACH PAPER COMPANY
Representative
or write direct to

®Reg. DuPont T.M.

Shuford Mills, INC SINCE 1880
HICKORY N C
CLOTHES LINES • TWINES
PRESSURE-SENSITIVE PAPER TAPES
SASH CORDS • WEATHER STRIPPING
COTTON & RAYON YARNS • EXTRUDED PLASTICS

World's Largest Manufacturers of Cotton Cordage

3430

. . . for more details, circle No. 68

Industrial Developments Reported in Portland Area

PORTLAND — In a resume of industrial developments in this area during January, the Portland Chamber of Commerce reports that *Atkins Saw Division, Borg Warner Corp.*, has expanded operations here. Emphasis will be placed on saws for the lumbering industry, particularly large circular saws for world-wide distribution. Plans call for doubling the present payroll when saw facilities are in capacity operation.

Another development concerns *Powermaster, Inc.*, which plans a $350,000 facility for remanufacture of new automotive parts. Construction on the first unit of the plant, located on a 3½ acre site in Beaverton, is scheduled soon.

An expansion program at *Great Western Chemical Co.*, regional distributor of agricultural and industrial chemicals, includes purchase of a 60,000-sq. ft. building in the Guilds Lake district.

A new $100,000 warehouse and office building for *Boysen Paint Co.;* an addition to storage facilities for *Davidson Baking Co.*, and a two-story addition for *Western Woods, Inc.*, are other expansions reported in this area.

Columbia-Geneva Buys Acreage in Wyoming

LANDER, WYO.—Columbia-Geneva Steel Co. has purchased a 161-acre tract of state-owned land near Atlantic City, south of here, as a site for a sedimentation dam. The company has been acquiring property and water rights in the area and has been conducting extensive tests on the feasibility of building an iron ore processing mill there

Arizona Steel Fabricators Elect New Officers

PHOENIX—At the annual meeting of Arizona Steel Fabricators Association here recently, *J. L. Fried* of Acme Steel Co. was elected president, succeeding *C. L. Howard* of Pioneer Steel Co. Other officers include *David Schuff* of Technibuilders, Inc., vice president; *E. J. Peake*, Allison Steel, secretary, and *Howard*, treasurer. All are of Phoenix.

Wire Rope Corp. Opens Warehouse in Los Angeles

LOS ANGELES — Wire Rope Corp. of America, St. Joseph, Mo., has opened a new warehouse at 1018 S. Santa Fe Ave., to service distributors with Wireco Brown Strand wire rope and slings.

The facility will serve Southern California; Las Vegas, Nev.; Prescott, Phoenix and Tucson, Ariz. District sales manager is *Norman Shabaz* and warehouse manager, *Harry Springmeyer*.

PUMPS ON YOUR MIND?

Send for this VIKING Pump Data

VIKING ENGINEERING DATA — A 36-page pump engineering manual is yours for the asking. It fully explains the 10 easy steps in selecting Viking rotary pumps Ask for catalog K.A.

VIKING HEAVY DUTY PUMPS — Available in 10 to 1050 G.P.M. sizes, these rugged Vikings are suitable for pressures up to 200 PSI. Complete with specifications performance data, etc., they are illustrated in the 24-page catalog C.A

VIKING GENERAL PURPOSE PUMPS — These Viking Pumps—in 2/3 to 1050 G.P.M. sizes—are suitable for pressures up to 100 PSI. They are fully illustrated and have specifications, performance data, etc., in the 36-page catalog B.A.

All Viking Pumps are positive displacement pumps and deliver either thin or thick liquids.

VIKING—the leader, not a follower, in Rotary Pumps

VIKING PUMP COMPANY
Cedar Falls, Iowa, U.S.A. In Canada, it's "ROTO-KING" pumps

Pacific Coast Distributors: Viking Pump Company of Los Angeles, 4432 Long Beach Ave., Los Angeles, Calif.; De Laval Pacific Co., 201 E. Millbrae Ave., Millbrae, Calif.

. . . for more details, circle No. 69 on Reader Service Postcard

American Potash to Build First Big Boric Oxide Plant

TRONA, CALIF. — First large-scale commercial plant to produce boric oxide (boric acid anhydride)—widely used in manufacturing high-energy fuels and for many industrial applications — will be built here by American Potash & Chemical Corp.

Design and engineering for the new facility are completed and construction is slated to begin soon. Estimated cost of the new facilities, located at AP&CC's main plant here, is $800,000.

Production of boric oxide is scheduled for late this year.

The firm also announced that an accompanying increase will be made in the plant production capacity of boric acid, which has various industrial uses and is the starting material in boric oxide manufacturer.

California Cotton Mills, Oliver-Roberts Merge

OAKLAND — California Cotton Mills Co. and Oliver Roberts, Inc., have announced plans for a merger, effective April 1. No changes in personnel will result and *Gilbert L. Roberts* will head up the joint activity.

Oliver-Roberts, organized in 1953, has been a distributor and manufacturers' representative for California Cotton Mills through the 11 Western states, Hawaii and the Philippines.

California Cotton Mills occupies a 60,000 sq. ft. plant here. Its wide range of cotton products includes mops for all purposes; cotton wrapping, seine and agricultural twine; rug filler yarn, carpet warp and similar products.

Aerojet-General Plans $894,892 Construction

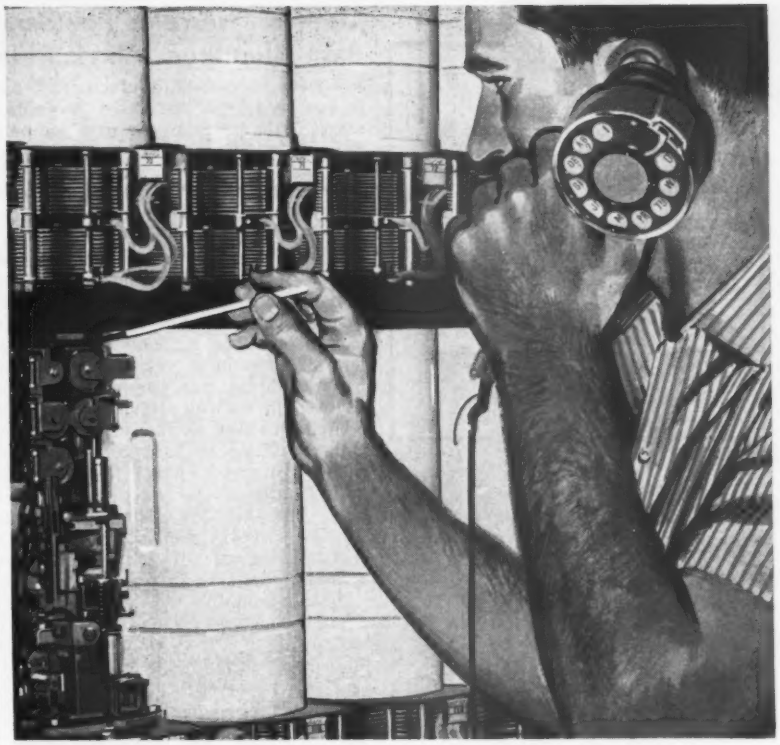
SACRAMENTO — Aerojet-General Corp. plans a new construction program totaling $894,892 to expand its facilities here. The expansion includes a sizeable addition to warehouse facilties, a $266,000 service building and a $122,500 plant for instrument design and analysis.

New Sales-Service Facility for Towmotor in Southwest

Towmotor Corp., Cleveland, and Gerlinger Carrier Co., Dallas, Ore., announce expansion of sales and service facilities to serve southern New Mexico and western Texas.

Associated Supply Co., Lubbock, Tex., which currently handles sales service and replacement parts for Towmotor-Gerlinger material handling equipment, has opened a sales office-service shop at 718 N. Copia St., in El Paso.

The Towmotor-Gerlinger line includes fork lift trucks with capacities from 1500 to 40,000 lb., and material carriers with capacities up to 60,000 lb.



ESSENTIAL TOOL OF THE TELEPHONE INDUSTRY...

the step-by-step dial switch.

Seven of these guide your call to its destination within seconds—making as many as 1,100 separate electrical connections in the process.

ESSENTIAL TOOL OF ALL INDUSTRY

...modern banking services

Such are the facilities of California Bank, the business-minded bank serving the Industrial Center of the West.

California Bank

Los Angeles

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

... for more details, circle No. 70 on Reader Service Postcard

CM
Lodestar®
electric hoist

now...
important
new models

LARGER CAPACITY

FASTER SPEEDS

GREATER SELECTION...from a complete range of capacities and speeds ...1/8 to 2 tons and 8 to 60 fpm.

Here's your opportunity to slash lifting and handling costs. Put these new Lodestars to work where their increased speeds and capacity match your maximum requirements.

LODESTAR FEATURES INCLUDE:

- Safe, Heavy Duty Performance
- Lowest Headroom
- Push Button Control
- Fully Enclosed Components
- Self-Adjusting Magnetic Brake
- Ultra-Modern Electric Braking
- CM-ALLOY Flexible Link Chain
- Minimum-Maintenance Operation
- Lifetime Lubrication

Request catalog and name of local stocking distributor.

CHISHOLM-MOORE HOIST DIVISION
Columbus McKinnon Chain Corporation
TONAWANDA, N.Y.
NEW YORK • CHICAGO • CLEVELAND
In Canada:
McKinnon Columbus Chain Ltd.,
St. Catharines, Ont.

CM HOISTS

. . . for more details, circle No. 71

Stauffer, Hercules Powder Plan Aluminum Alkyls Plant

SAN FRANCISCO — Manufacture of aluminum trialkyls and other aluminum alkyls is the purpose of a new company formed by Stauffer Chemical Co. and Hercules Powder Co. Capacity of the new facility is scheduled to be over 1,000,000 pounds yearly. Site of the plant has not been revealed.

The new company will use the patented Ziegler process and will be the first large installation in this country to produce aluminum commercially by that means. The products are useful as intermediates in preparation of various polymerization catalysts and can also be used in making straight-chain alcohols and olefins, as fuel in ramjet-powered missiles and as high altitude jet flame sustainers. Highly reactive compounds, the alkyls, when available in large quantities, may foster development of several other uses.

According to officials of the two companies, the venture is a major step in development of a new area of metallo-organic chemistry. Plans call for distribution of the new plant's output by Stauffer's Anderson Chemical Co. Division.

Simpson Timber Forms Wood Products Division

SEATTLE—Simpson Timber Co. has announced formation of its fourth operating division, to be called Simpson Engineered Wood Products Co., to design and sell products in whatever shape or form wood can be processed for customer needs.

General manager of the new unit is *William A. McKenzie* of Seattle. National Tank and Pipe Co. of Portland will become part of the new operation and its facilities will be expanded.

ENGINEERED WOOD PRODUCTS
Corrosion Proof

Windeler Built

Wood Tanks
Cooling Towers
Custom Millwork
Scrubbing Towers
for Smog Control

"OUR 74th YEAR"

GEO. WINDELER COMPANY, LTD.
VAlencia 4-1841
2225 JERROLD AVE.
SAN FRANCISCO 24,
CALIFORNIA

. . . for more details, circle No. 72

Alcoa Installs Automatic Pig-Casting Machine

VANCOUVER, WASH. — Currently scheduled for shake-down tests at the Alcoa plant here is a $100,000 machine for automatically casting 50-pound aluminum pig that will emphasize surface appearance of the product. According to officials here, more uniform appearance is a relatively new factor in customer interest.

Designed to machine cast 50-pound pig, the new unit will centralize all pig pouring now done in the end of each potroom. The machine is a continuous-casting unit with pig molds linked side-to-side on a continuous chain. The pigs drop out of molds as they swing up and invert after cooling, in an operation similar to that process now used in continuous casting customer ingot of various sizes.

More uniform size, quality and appearance than is possible by hand-pouring will be achieved by the new machine, which enables Alcoa to use minute controls to improve surface appearance.

Superweld Acquires All Western Carbide Stock

NORTH HOLLYWOOD, CALIF.—Superweld Corporation announces acquisition of all outstanding stock of Western Carbide Corp., specialists in a line of hard-facing alloys. *Hoyt Todd,* former vice president and chief metallurgist of Western Carbide, will continue association with Superweld, a leading firm in fields of heat and corrosion resistant metal finishing. The firm is currently active in research and development work for aircraft and missile manufacturers.

Shell Development Unit Reports First Production

MARTINEZ, CALIF.—Initial production from its $2,000,000 market development unit here has been announced by Shell Chemical Corp. First run of products included several derivatives of acrolein, according to *A. W. Fleer,* newly-appointed manager of the Industrial Chemicals Division.

The unit, designed to produce semi-scale quantities of industrial chemicals resulting from Shell's research, has several different reactor and purification systems. Combinations of these make the unit capable of producing a wide range of products in capacities ranging from 1,000 lb. to tank car quantities.

Eitel-McCullough Starts Company-wide Expansion

SAN CARLOS, CALIF. — A company-wide construction program this year affecting facilities here, in San Bruno, Calif., and in Salt Lake City, Utah, has been announced by Eitel-McCullough, Inc., manufacturer of electron-power tubes.

The program includes a $100,000 construction program begun recently at San Bruno to reorganize the manufacturing area and expand research and engineering operations. At the firm's recently completed $2,500,000 plant in San Carlos, plans are underway to add 27,000 sq. ft. of manufacturing space. Work will begin this year.

The Salt Lake City plant has started a five-year construction program that will include both new construction and reorganization of present facilities within the next few months.

Feed Mill, Other Facilities Slated for Portland Tract

PORTLAND—Proposed construction of a feed mill and other facilities valued at up to $4,000,000 is slated to be the initial project in the industrial district under development by the Port of Portland in Mocks Bottom off Swan Island. The Port is selling a 10-acre tract in this district to Washington Cooperative Farmers Association, which will build facilities to serve farmers in Oregon and Southwestern Washington.

In addition to the proposed $1,500,000 mill, development of the tract will include egg handling and distribution facilities and a poultry processing plant.

Lerco Adds to Plant, Expands Molding Facilities

BURBANK, CALIF. — Lerco Electronics, Inc., has added a new 2,700-sq. ft. addition to its plant at 501 S. Varney St., to house expanded plastic molding operations.

Scheduled for completion in February, the new building triples Lerco's molding department plant area and will house recently-purchased injection and compression molding machines.

According to *Hugh P. Moore*, board chairman, the firm now catalogs over 100 stock molded terminals, largest in the industry. With addition of new facilities, Moore said, the company plans soon to announce a new line of instrument control knobs and to seek orders for custom molding of electronic parts.

Litton Group Moves Into New Facility

LOS ANGELES — A commuter research group from Litton Industries' Electronic Equipment Division is moving this month into a three-building, 30,600-sq. ft., facility at 11738 West Olympic Blvd. Engaged in research and analysis on computers for military and industrial applications, the group was formerly located in Litton's Culver City computer development center.

Phoenix Diesel Firm Plans Move to Larger Quarters

PHOENIX — A move to larger quarters in April has been announced by Min-A-Con Equipment Co. and the Diesel Service Co., now located at 1904 E. Buchanan.

The new quarters will consist of three buildings at 2808 N. 27th Ave., one of which is now under construction, according to *Len Beck, Sr.*, president.

Missile Facility May Be Built Near Wells, Nevada

WELLS, NEV. — Boeing Airplane Co., Seattle, Wash., was credited by businessmen in Wells, Nevada, with plans for a facility south of Wells in the Tobar Flat area which would employ some 500 persons.

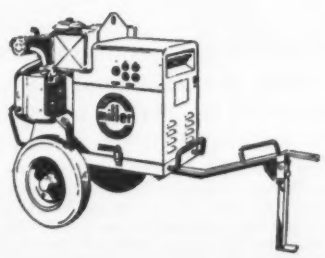
Boeing has a prime contract with USAF on test and assembly of the Minuteman as well as development of logistic devices for the missile.

The firm, surveying this area, has confirmed only that its activity in Wells is in connection with a joint survey by Boeing and USAF for the Minuteman program.

THE ENGINE-DRIVEN WELDER/ POWER PLANT with the

100% DUTY CYCLE

An original Miller design with performance standards, ruggedness and versatility that have made it a top hand from the Texas oil fields to New York dairy farms. Because, whether the AEA-200-L is hub deep in mud welding a derrick brace, or supplying power for lights and milking machines, or answering an emergency call aboard a repair ship. . . . IT DELIVERS. Currently a best seller in the highway construction market, the Miller AEA-200-L is handily the "finest in the field," and here's why:



- All-weather construction
- Onan 12.9 h.p. air-cooled engine coupled directly to generator
- Full 225 ampere output
- 100% DUTY CYCLE
- 5 KW, 115/230v ac
- 1 KW, 115v auxiliary dc
- Uses any ac or ac-dc 1/16" to 3/16" electrodes
- Seven station amperage selection with continuous current control

Other Miller welder/power plants for metallic arc and TIG welding to 350 amperes.

Complete particulars will be sent promptly.

miller ELECTRIC MANUFACTURING COMPANY, INC., APPLETON, WISCONSIN

Distributed in Canada by Canadian Liquid Air Co., Ltd., Montreal

. . . for more details, circle No. 73 on Reader Service Postcard

did you ever need an answer about the use of steel castings IN A HURRY ?

If you received your answer, you may have called Pacific Steel. If not, you should have called us.

We specialize in answers when you run into difficulty. As a matter of fact, we've been quite successful in this department for 25 years.

When you call in a Pacific Steel man, you're not just calling in a vendor. You're calling in a foundry service man whose specialty is steel castings. And you're not paying extra for this service. In effect, you're adding an extra idea source and expediter to your staff, but not to your payroll.

You can pick his brains, demand a high quality product and insist on excellent service. We'll give very long odds you'll be more than satisfied on all three counts. You'll even get a bonus—substantial end cost savings. (Ask us what that can mean).

PACIFIC

PACIFIC STEEL CASTING CO.

1333 2nd St., Berkeley, Calif.

LA 5-9200 EN 1-0983

. . . for more details, circle No. 74

Bethlehem Pacific's New Bar Mill Ups Production 40%

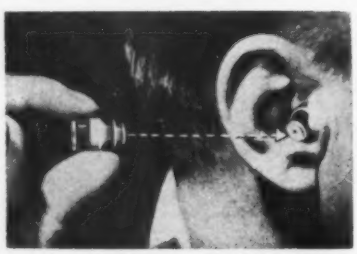
SEATTLE — Last major installation in the two-year expansion and modernization program for Bethlehem Pacific's steel plant here—a new merchant bar mill—is now in production. The new facility has a capacity 40% greater than the old mill which was dismantled in December.

According to *W. J. Bolton,* general manager, the mill, a modified cross-country type, is the most modern of its kind in the U. S. It is housed in a building about 900 ft. long, and the hot-bed alone, where steel bars gradually cool after they have been rolled in the mill, is 240 ft. long. The versatile rolling mill has 14 mill-stands that can be used in several combinations to produce a wide range of bars, bar-size and small structural shapes.

In only 45 seconds a steel billet 4 x 4 in., and 15 ft. long can be rolled into ½-in. diameter concrete reinforcing steel.

Previously at this mill men used to snake the red-hot steel from mill-stand to mill-stand with hand tongs. Now it's all done with levers and push-buttons in two control booths. The steel moves from the reheat furnace, through the various mill stands and onto the hot-bed "untouched by human hands."

***Lee Sonic* EAR-VALVS**
Eliminate the HARMFUL Effects of NOISE to The EAR DRUMS . . .



A FREE 30 Second Demonstration will PROVE this BEYOND QUESTION. We GUARANTEE THAT! Remember they are NOT EAR PLUGS! They are scientifically developed sound controls that protect the ear drums without interfering with normal conversation or sound. We'll gladly send you a pair for actual demonstration. THEN you will find out why they are recommended and used wherever NOISE is a HAZARD and a deterrent to normal production. Send for your demonstration pair TODAY on company letterhead. No obligation to purchase.

SIGMA ENGINEERING COMPANY
1491 Vine St., Dept. W Los Angeles 28, Calif.

. . . for more details, circle No. 75

Huge Oxygen Storage Tank Installed in Montana

BUTTE, MONT. — A 1,500,000-cu. ft. storage tank to supply Western Montana industry with liquid and gaseous oxygen is now in operation at the Linde Co. plant here. At dedication ceremonies held recently, *M. P. Merkle,* plant superintendent, hailed the installation as a major step forward in providing mining, railroad and steel fabricating industries with an unlimited supply of oxygen.

John Hassall Names Two Western Representatives

WESTBURY, L. I., N. Y.—New sales representatives for four Western states have been appointed recently by John Hassall, Inc., manufacturer of rivets, nails, screws, and cold-headed specialties.

Blake Smith

Appointed a direct factory sales representative in California was *H. Blake Smith,* formerly with the firm in Long Island. Smith's address is P. O. Box 277, Buena Park, Calif., where the telephone number is LAwrence 2-1805.

In Seattle, the company has named D. H. Lundin & Co., 5501 University Way, as sales representative covering the states of Washington and Oregon.

Butcher Co. Warehouse Started in Seattle

SEATTLE—Construction has begun on a $600,000 warehouse and office building at 1st Ave. S. and Orcas St. here that will triple expansion of present facilities for the L. H. Butcher Co., a subsidiary of Udylite Corp., Detroit. The firm distributes heavy chemicals, processes agricultural chemicals and handles equipment and supplies for metal finishing.

Present quarters for the firm are at 1703 Sixth Ave. So., and the company also has facilities in Los Angeles, San Francisco, Salt Lake City and Portland. *John Tiedemann* is the Butcher Co. general manager here.

Convair Unit Triples Space with San Diego Move

SAN DIEGO—More than triple its former space is now occupied by Convair Instruments with its recent move into quarters at 3595 Frontier St. A facility of Convair Division of General Dynamics Corp., it was formerly known as Datafax Instruments, located in La Jolla, Calif. Products are electrical and mechanical instruments and transducers for various industrial applications and include a wide range DC voltmeter, liquid-gas detectors, and a fluid leak meter.

Calstrip will produce Stainless Steel Strip

LOS ANGELES—Calstrip Steel Corp., 7140 Bandini Blvd., announced that it will be producing steel strip, starting next month.

The firm says it is now completing installation of a new continuous annealing and pickling line for the "first production of stainless strip in the West."

Calstrip adds that the latest type annealing furnace, salt bath and pickling equipment is being used along with special feeding and rewind units. Operations are contained in a 260 ft. long building recently erected.

Stainless steel strip will be rolled in widths of 13-in. on the Sendzimir mill installed by Calstrip several years ago. Extremely close tolerance strip is available in a thickness range of .008-in. to .075 in.

Yuba Consolidated Erectors Formed as New Division

SAN FRANCISCO—A new division, Yuba Consolidated Erectors, Inc., has been announced by Yuba Consolidated Industries, Inc. The new unit will perform on a national basis all field erection work for the corporation's heavy steel fabricating divisions, coordinating use of equipment and personnel previously controlled individually by Yuba's six steel fabricating divisions. Headquarters staff of the division is at 351 California St. here.

Motor Freight Firms In Northwest May Merge

SEATTLE—Plans are underway for merging three major Pacific Northwest motor freight firms — Inland Motor Freight of Spokane, Garrett Freight Lines of Pocatello, Ida., and Pacific Highway Transport of Seattle. Combined assets of the three are more than $14,000,000.

Albuquerque Firm Bought by Curtiss-Wright Corp.

ALBUQUERQUE, N. M.—Inter Mountain Instruments, Inc., has been acquired by Curtiss-Wright Corp., and will become a branch of that company's electronics division. As a branch, Inter Mountain will continue to produce its own line of equipment, including electromechanical transducers, transistor test equipment, data processing and gathering systems, etc. *John F. Quirk* will manage the new branch.

R. S. Hughes Doubles Space

LOS ANGELES—R. S. Hughes Co., Inc., distributing firm, has moved into new quarters at 4515 Alger St., a move that more than doubles the firm's warehousing space.

Formerly located at 1759 Victory Blvd., Glendale, the firm also has leased an additional warehouse for its Northern California branch at 564 College Ave., Palo Alto.

The CF&I Image assures precision-made
Industrial Wire Cloth

Symbol of dependable steel products for industry, the CF&I giant offers wire cloth for many uses . . . filter cloth, window and machinery guards, reinforcing materials, industrial processing and conveying components, decorative uses and many others.

Whatever the application, you get these advantages in CF&I Industrial Wire Cloth:

- Wide variety of sizes and metals—CF&I Industrial Wire Cloth is available from 6" openings down to 200 mesh. You can specify from a wide range of metals—steel, galvanized steel, stainless steel, aluminum, brass, copper, monel and other alloys.
- Tight weave; square, even mesh—CF&I's years of fabricating experience provide a strongly woven cloth that assures accuracy, long life and an attractive appearance.

The CF&I Image offers other dependable steel products:
Coburn Overhead Conveying Systems, Sliding Door Hardware, Fire Door Hardware and Wissco Woven Wire Processing Belts.

For quick price and delivery information on any CF&I product, contact our nearest sales office.

8605

INDUSTRIAL WIRE CLOTH
THE COLORADO FUEL AND IRON CORPORATION

In the West: THE COLORADO FUEL AND IRON CORPORATION—Albuquerque • Amarillo • Billings • Boise • Butte • Denver • El Paso Ft. Worth • Fresno • Houston • Lincoln • Los Angeles • Oakland • Oklahoma City • Phoenix • Portland • Pueblo • Sacramento • Salt Lake City San Francisco • San Leandro • Seattle • Spokane • Wichita
In the East: WICKWIRE SPENCER STEEL DIVISION—Atlanta • Boston • Buffalo • Chicago • Detroit • New Orleans • New York • Philadelphia
CF&I OFFICE IN CANADA: Montreal • CANADIAN REPRESENTATIVES AT: Calgary • Edmonton • Vancouver • Winnipeg

. . . for more details, circle No. 76 on Reader Service Postcard

"POP" RIVETING
...is as easy as-

1 SIMPLY INSERT THE "POP"* RIVET INTO THE RIVET GUN. Hand operated or power guns are available depending upon your needs. "POP" Rivets can be used to fasten all materials . . . metals to metals, metals to plastics, and plastics to plastics.

2 INSERT THE RIVET IN THE PRE-DRILLED HOLE. Bring the rivet to the work . . . not the work to the fastener. No lock washers or jam nuts are required. INSTALLED COSTS ARE LESS than any other type of fastener requiring a pre-drilled hole.

3 AND SQUEEZE. The "POP" rivet "pops into place." Being a hollow "blind" rivet, the "POP" Rivet clinches from the head side only . . . you can place the rivet anywhere . . . even in those hidden areas because "back-up or bucking" is eliminated.

HUGE INVENTORY AND SERVICE CENTER

The Universal Molding Company maintains a very complete stock of sizes and styles of "POP" Rivets and "POP" Rivet tooling. In addition, Universal also offers the only "POP" Rivet service repair in the West.

Phone or write for complete information. A Service Engineer will be happy to demonstrate the many uses of "POP" Rivets anywhere in Southern California.

*Trade Mark-Manufactured by United Shoe Machinery Corp.

Universal
MOLDING COMPANY
10807 Stanford Avenue
Lynwood, Calif. NEvada 6-9721

. . . for more details, circle No. 77

New Contracts in the West

LOS ANGELES — A multi-million dollar contract from *Boeing Airplane Co.* for stainless steel honeycomb panels for the B-70 bomber wing was awarded to *Rohr Aircraft Corp.* of San Diego. *North American Aviation, Inc.*, is in charge of the overall B-70 contract. *Solar Aircraft Corp.* of San Diego also has been awarded a contract, totaling nearly $1,000,000 for manufacture of all-metal honeycomb sandwich components for the B-58 jet bomber.

Among Western firms who participated in the recent awarding of some $1,500,000 contracts from the U. S. Army Ordnance District, Los Angeles, are:

Radioplane, Div. of Northrop Aircraft, Inc., a $596,369 research and development contract for target drones;

Gilfillan Brothers, Inc., a $164,647 contract for engineering services, a $75,444 contract for Corporal missile repair parts, and a $53,361 contract for telemetry and instrumentation packages;

Harvey Aluminum, a $264,680 research and development contract for developmental engineering;

Telecomputing Corp., a $104,205 contract for testers;

Rheem Manufacturing Co., a $98,605 research and development contract;

Aerojet-General Corp., a $45,468 contract for measurements and accumulation of missile data;

The Firestone Tire & Rubber Co., a $45,000 contract for Corporal missile repair parts;

Douglas Aircraft Co., Inc., a $38,454 contract for Nike missile repair parts;

California Institute of Technology, a $36,000 contract for research and development work;

Bendix Aviation Corp., a $27,409 supply contract for valves.

Other concerns who have reported contracts recently include:

B. J. Electronics, Borg-Warner Corp., a $500,000 production contract for GMD-1 transportable ground tracking and data-recording equipment for the Signal Corps;

Beckman Instruments, Inc., a $225,000 contract from Boeing for a new high-speed analog computer for the Bomarc Weapon System;

Aeronutronic Systems, Inc., a contract on instrumentation planning for the Pacific Missile Range, by the Navy Dep't. Bureau of Aeronautics;

Telecomputing Corp., contracts from Western Electric Co., totaling $1,650,000, for production of precision gyros for use in both Nike-Hercules and Nike-Ajax missiles;

Gladding, McBean & Co., a radome contract from Raytheon Mfg. Co., for ceramic nose cones for the Sparrow III, air-to-air missile, and

Gunderson Bros. Engineering Corp. of Portland, an $850,000 contract from the Navy Department for construction of two LCU's, utility landing craft.

BRONZE BEARINGS

• KINGWELL stock & special
• ASARCON continuous cast
• OILITE self lubricating

Kingwell
103 YEARS OF PROGRESS 1855
457 Minna St., San Francisco, California
2618 E. 53rd St., Huntington Park, California
Distributors in principal western cities

. . . for more details, circle No. 78

Trimview, Fuller Subsidiary, to Quadruple Production

COVINA, CALIF.—Quadrupled production is planned by Trimview Metal Products with its addition of 34,000 sq. ft. of factory space this year and installation of new finishing facilities.

A subsidiary of W. P. Fuller & Co., Trimview manufactures patio doors, windows, shower doors and tub enclosures. The new addition will provide straight-line production and enable the firm to produce 10,000 metal frame doors and 10,000 windows per month on a single shift operation, according to *Elwood W. Buck, Jr.*, general manager.

Trimview began operations here 2½ years ago with 30 employees. It now employs 125. The firm plans to have a new sliding window ready for distribution this month.

Harvey Aluminum Has New San Diego Address

SAN DIEGO — Harvey Aluminum has moved its sales engineering offices here to larger quarters at 426 Olive St., where the telephone number is CYpress 6-6101. The firm has its general offices and mill in Torrance, Calif., and a primary aluminum reduction plant in The Dalles, Ore.

Coast Envelope Plans New Los Angeles Facility

LOS ANGELES — Construction of a new factory and office building for Coast Envelope Co., is scheduled here soon, with completion of the 100,000-sq. ft. facility set for this summer.

The building, which will cost about $500,000, will occupy a four-acre site in the 2900 block of Vail Ave. in southeast Los Angeles. Three deck-high truck bays and a dock off the rail spur will be included at the facility.

Located in Los Angeles for 42 years, Coast Envelope manufactures commercial envelopes, employing more than 300 persons. The firm also has a plant at 346 First St., San Francisco.

Robert B. Porter to Handle Parker Line of Seals

CULVER CITY, CALIF. — Parker Seal Co., division of Parker-Hannifin Corp., announces appointment of the Robert P. Porter Co., as a distributor for the firm's industrial Gask-O-Seals and Stat-O-Seals.

Porter has headquarters at 1804 Chiquita Pl., Glendale, and a Northern California division at Hayward Municipal Airport, Hayward, to serve the Bay Area. *C. Mercer Barnes* heads the latter division, assisted by *Robert Soloff*, Parker Seal Co. representative in San Francisco. The Glendale operation will have call on services of the Parker Culver City staff.

Extensive stocks of the seals for pipe flange connections and for bolts, studs and other fasteners are carried at both locations.

Engineered Electronics Pays Off for Efficiency

SANTA ANA, CALIF. — Efficiency isn't paid off in green stamps—but up until the day Engineered Electronics employees got their recent bonus, it was hinted that might be the reward method!

Instead, 75% of the employees received a $100 bill and the balance in check form. This was a bonus equal to 19% increase in pay for the fourth quarter of 1958, or equal to nine extra weeks' pay, employees were told by *T. W. Jarmie*, president.

Reason for the green stamp rumor was that the firm's second quarter payment in the profit-sharing plan came in silver dollars, while the third quarter dividend was paid in $2 bills.

Increased efficiency, speed and accuracy of the employees made the profits for the year shoot up by 30%, while sales increased 7%. This was the ninth cash distribution since the plan was begun in 1956.

Industrial Air Products Plans Hydrogen Operation

PORTLAND—An electrolytic hydrogen operation is scheduled by Industrial Air Products Co. on completion of an expansion at its Front St. plant here. According to *Kurt Kuhlmann*, superintendent, this will be the only plant in Oregon to produce hydrogen except as a by-product.

In the operation the firm will use electric power to decompose water into its constituents, including hydrogen. Hydrogen will be compressed and placed in high-pressure cylinders. Part of the product will be sold and some used in Industrial Air Products' plant at 3200 N. W. Yeon Ave., where hydrogen is used in refining argon.

The new operation will be housed partly in a new addition, with the facility representing an investment of some $50,000.

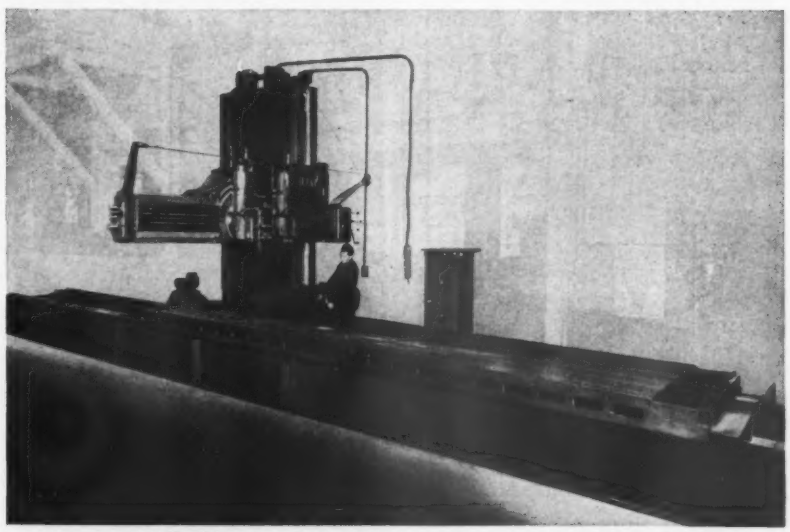
Poultry Processing Plant

FRESNO, CALIF.—Cal-Best Poultry, Inc., will build a $600,000 processing plant at 1636 S. Second St., here. Scheduled for June 1 completion, the facility will replace and expand present facilities in Tulare, Calif. Employment at the new plant is estimated at 100 to 150.

MOORE FACILITIES

Giant Planer Cuts Machining Cost

Cut costs! Speed production! Moore does both with a heavy duty openside planer. It's part of the all-inclusive machining facilities at Moore which emphasize use of special and heavy duty tools, such as large vertical and horizontal boring mills, lathes, grinders, and many others. Let your machining job benefit from Moore's 50 years of experience. Consult Moore... for one-stop, one-shop machining requirements.



MOORE DRY DOCK COMPANY

Forging • Heat Treating • Machining
Plate-Sheet-Pipe Fabrication • Grinding
Structural Steel Fabrication and Erection

FOOT OF ADELINE STREET, OAKLAND 23, CALIFORNIA
Higate 4-3919

. . . for more details, circle No. 79 on Reader Service Postcard

ACCURATE STROKE CONTROL

HyPOWER

TURLOCK IRON & MACHINE WORKS
TURLOCK, CALIF.

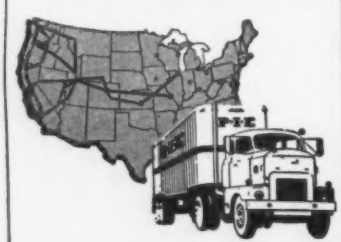
Accurate control on HyPower Cylinders is maintained through simple application only. Controlled stroke with HyPower stroke control clamps is accomplished simply and accurately without set collars, oil valves, plungers, screw or pin adjustments.

Write Today for FREE Catalogue

GRETHER and GRETHER
SALES REPRESENTATIVES
P. O. BOX 47 STOCKTON, CALIF.
P. O. BOX 1036 WHITTIER, CALIF.

. . . for more details, circle No. 80

Shippers Agree... It's P·I·E!



P·I·E

PACIFIC INTERMOUNTAIN EXPRESS

TERMINALS AND OFFICES IN PRINCIPAL CITIES

GENERAL OFFICES: P·I·E BUILDING
14th AND CLAY STREETS
P. O. BOX 958 OAKLAND 4, CALIF.

. . . for more details, circle No. 81

Republic Supply to Handle Amercoat's Bondstrand

LOS ANGELES — Republic Supply Co., 2600 S. Eastland Ave., has been appointed by Amercoat Corp. of South Gate, Calif., as exclusive distributor for Bondstrand plastic pipe and fittings in California, Arizona and Nevada.

An industrial supply house, Republic stocks some 35,000 industrial and oil country items and maintains a staff of 200 specialists, with major centers here, in San Leandro and San Diego and other branches in the West.

Bondstrand, a fiberglass reinforced epoxy pipe, is nontoxic, nonflammable and corrosion resistant. Fittings include 90 and 45-deg. elbows, tees, flanges and couplings for plain end or threaded Bondstrand pipe.

$10,500,000 Research Unit Planned by Ramo-Wooldridge

LOS ANGELES—Plans for construction of a $10,500,000 research and development facility for Ramo-Wooldridge Research Laboratories has been announced.

The complex will consist of six structures enclosing more than 380,000 sq. ft. on a 90-acre site in the western section of the San Fernando Valley.

The Laboratories, a division of Thompson Ramo Wooldridge, Inc., will comprise the California research and development facility of the corporation's industrial and manufacturing interests.

Completion of the facility, to be built by Twaits-Wittenberg Co., is scheduled for late this year.

WE KNOW HOW to prevent LOSSES IN YOUR PLANT from RUST DIRT CORROSION

• Specialty Coatings
• Sandblasting
• Industrial Painting

Anywhere in the West

A. H. Barbour & Son, Inc.
Industrial Painting Contractors
2828 N. E. Alberta, Portland, Oregon
ATlantic 2-2251

. . . for more details, circle No. 82

Emeryville Firm to Handle Kaiser Welding Wire

EMERYVILLE, CALIF.—Balaam Brothers, 1350 Powell Ave., has been appointed a distributor of King Brand bright surface aluminum welding wire made by Kaiser Aluminum & Chemical Sales Corp.

The Balaam firm, covering the Oakland-East Bay area, will supply the wire in spools and straight lengths in all commercially used aluminum alloys including the new 5183 alloy. Balaam Brothers carries a complete line of welding gases, equipment and supplies.

Arizona Firm to Farm Out Piece Work to Women

MESA, ARIZ.—A farming-out operation, employing some 300 women in this area, was announced as a pre-production phase for a new manufacturing firm here.

William E. Johnson, head of the newly-formed Jokco Manufacturing Co., said he planned to farm out piece work for women to do in their homes before he opens a plant for production of children's aluminum furniture.

With a back-log of raw materials, Johnson expects to open his plant at 550 W. Fourth Ave. this month. He said he hopes to pick his workers from the more needy families in this area. The finished work will be picked up by truck.

Sausalito Firm Doubles Plant Area, Adds Equipment

SAUSALITO, CALIF.—An expansion that will double its area was completed recently by Marine Machine, Inc., which is engaged in sub-contract work for guided missile prime contractors. The two-year-old firm has also added some $150,000 worth of precision machine tools.

Currently the company is operating on two shifts, but is seeking skilled machinists so that a third shift can be added. The firm recently received a $200,000 contract.

Arizona Copper Output More Than Rest of U. S. Combined

PHOENIX—The output of copper in Arizona hit a record peak in 1958, for the first time producing more than 50% of all the copper mined in the United States. This record was reached despite the fact that lowered prices cut the value of Arizona's production to $259,000,000. It was $310,000,000 in 1957.

WESTERNERS AT WORK...

New York Air Brake Co.

...transfers **Arthur J. Shivers** to the Los Angeles office as a sales engineer for the Kinney Mfg. Div., which manufactures vacuum pumps, and for the Vacuum Equipment Div. Shivers, a graduate of Temple University, has been with the company four years and was transferred from the Philadelphia office. He will be one of three sales engineers who will serve the West for these divisions.

Linde Co., Union Carbide Corp.

...names **Dr. C. R. Castor** as Western sales engineer for Crystal Products and Rare Gases. His territory includes the area west of the Rocky Mountains, with headquarters in Los Angeles, Calif. Dr. Castor holds a Ph.D degree from Duke University. He joined Linde in 1953 as a research chemist and, since January 1957, has been research supervisor at the company's Speedway, Inc. laboratories. Co-inventor of metal-loaded molecular sieves for use as catalysts, Dr. Castor has more recently been engaged in research work on crystals, welding, combustion, and high current arcs.

Western Machinery Co.

...designates **Marvin J. Blakeway** as factory manager of the Western Machinery Co. plant in Sacramento, Calif. Blakeway joined Western Machinery in 1948 as foreman of the plate and structural steel works. In 1955 he was promoted to general foreman, and in 1958 to assistant factory manager.

Boysen Paint Co.

...promotes **Lewis T. Hayes** to branch manager in the Portland area and **Richard Hageboeck** as head of Portland manufacturing facilities. Hays moves up from Spokane and Hageboeck was formerly in Boysen's Oakland, Calif. laboratory.

U.S. Steel Corp.

...promotes **C. C. Morgan** to general superintendent of the Geneva Works near Provo, Utah. This is the largest Western steelmaking unit of the Columbia-Geneva Steel Div. of U.S. Steel. Morgan will be succeeded as general superintendent of the Pittsburg, Calif. Works by **George A. Jedenoff,** who advances from assistant general superintendent. Morgan started with the former Columbia Steel Co. in 1939. After serving in World War II he rejoined Columbia Steel at Pittsburg as works industrial engineer. He advanced through various positions until 1954 when he was transferred to the division's Torrance Works as general superintendent. He returned to Pittsburg Works in March, 1957 as general superintendent.

Timber Sales in Northwest for 1958 Set New Record

PORTLAND—A new record high volume for timber sales in Washington and Oregon was reached in 1958, according to *J. Herbert Stone,* regional forester. The volume was 4,371,000,000 board feet, an increase of over 60%, or 1,663,000,000 bd. ft. over 1957.

Allis-Chalmers Mfg. Co.

...appoints **Carl F. Meyer** as material handling sales manager of its Oakland, Calif. branch. Meyer comes to Oakland from the Atlanta, Ga. branch, where he also was material handling sales manager.

Lewis-Shepard Co.

...appoints **J. Platt Hamerslag, Jr.** as its exclusive sales and service representative in the San Francisco territory. Hamerslag, president of the Hamerslag Equipment Co., 110 Freeway Blvd., South San Francisco, will maintain a complete sales and service facilities for Lewis-Shepard customers in that area. Hamerslag has been associated with the material handling industry for 13 years and is active on the Board of Directors for the Materials Handling Equipment Distributors Association (MHEDA).

Soule' Steel Co.

...names **Stanley E. Soule'** as vice president-marketing. In his newly-created post, Soule' will direct the domestic marketing activities of the company. He was formerly assistant general sales manager. The new vice president-marketing will head up all sales and promotional programs for Soule' buildings, reinforcing steel, steel and aluminum doors and windows, metal lath, and other building products.

Joseph T. Ryerson & Son, Inc.

...announces the appointment of three district sales managers of its Los Angeles steel service plant. They are: **Freeman X. Kinzie, Loren B. Gray,** and **Harry M. Cassel.** As former managers of sales of stainless steel, tubing and cold finished steel bars and alloy steel, respectively, they retain assigned responsibilities in connection wtih the merchandising of these products while assuming broader sales duties in elected sales districts.

WHY PAY MORE?

1000 8x10 GLOSSIES 7¢ ea

MADE DIRECT FROM PHOTOS (OR NEGATIVES)

100 GENUINE 8x10 PHOTOS 10¢ ea

50 8x10 13c ea

500 8x10 8c ea

24-HOUR SERVICE

You Can't Buy A Better Photo At Any Price

FREE DELIVERY ANYWHERE

CUSTOM PHOTOS AT QUANTITY PRICES!

FOR COMPLETE PRICE INFORMATION WRITE OR PHONE

HO. 7-6178

QUANTITY PHOTOS, Inc.

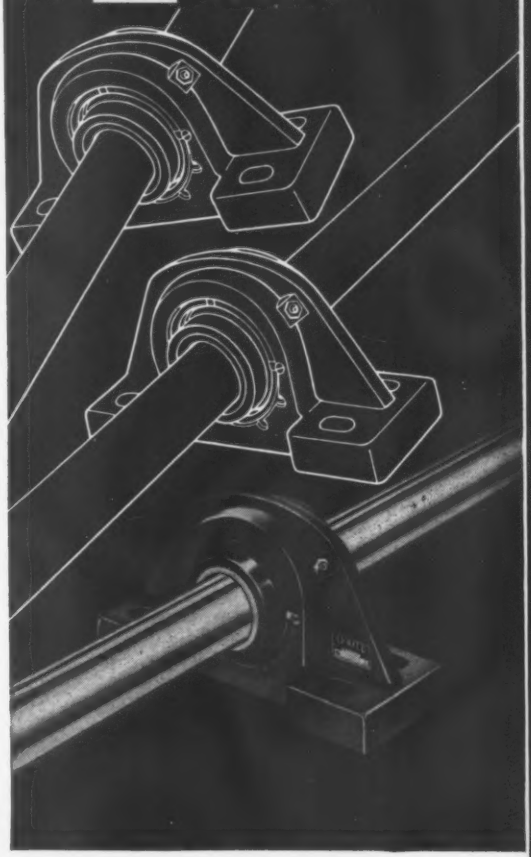
5509 SUNSET BLVD., HOLLYWOOD 28, CALIF.

LARGEST PHOTO REPRODUCTION PLANT IN THE WEST

. . . for more details, circle No. 83

Another PLUS value...

STAMINA AT ANY ANGLE



Under loads or shocks from any angle, whether radial, thrust or combined loads, Shafer Self-Aligning Roller Bearings always retain their high load capacity. Add misalignment and the load still remains safely on the roller centers reducing retainer wear, increasing bearing life. Why? Shafer CONCAVE roller and true sphere race design—proved longer lived in thousands of installations. See your nearby distributor or mail coupon.

SHAFER®

SELF-ALIGNING ROLLER-BEARINGS

CHAIN Belt Company 505
4723 W. Greenfield Ave.
Milwaukee 1, Wisconsin

(In Canada: CHAIN Belt Canada Ltd., 1181 Sheppard Ave. East, Toronto)

☐ Please send latest Shafer Roller Bearing Catalog.
☐ Have a Rex man call.

Name.....

Company.....

Address.....

City.....*Zone*.....*State*.....

. . . for more details, circle No. 84

ADVERTISERS in the March 1959 WESTERN INDUSTRY

A

Acme Chain Corporation 20
Air Reduction Pacific Company 24
Allen-Bradley Company 21
Allied Chemical Corp.
General Chemical Division 23
Allis, Louis, Company, The 99
American Brake Shoe Company
AmForge Division 13
American Brass Company, The 60
Armco Drainage and Metal
Products Inc 79

B

Barbour, A. H., & Son, Inc. 116
Brodhead Steel Products Co. 81
BullDog Electric Products Company 67 & 69
Byers, A. M., Company ..... 51 & 52

C

Cadillac Plastic Company of California 70
California Bank, Los Angeles 109
California Metal Enameling Co. 75
Campbell Chain Co. 87
Chain Belt Company 117
Chisholm-Moore Hoist Division
Columbus McKinnon Chain Corp. 110
Cleveland Tramrail Division, The
Cleveland Crane & Engineering Co. 44 & 45
Coldwell, Banker & Company 104
Colorado Fuel and Iron Corporation 113
Colt Ventilation of America, Inc. 6
Columbia-Geneva Steel Division, United
States Steel Corporation 89
Columbus McKinnon Chain Corporation 84
Crown Zellerbach Corporation 19

D

Dempster Brothers, Inc. 54
Douglas Fir Plywood Association 16
Ducommun Metals & Supply Co. ... Cover 3

E

Easterday Supply Company 76
Eaton Manufacturing Company
Reliance Division 15
Electric Steel Foundry Company .... Cover 4
Epps, Bernard & Company 22

F

Falk Corporation, The 5
Fernholtz Machinery Co. 98
Fiske Brothers Refining Co.,
Lubriplate Division 100
Food Machinery Corporation
John Bean Division 90

G

Gar-Bro Manufacturing Company 105
General Metals Corporation
Foundry and Forge Division ..... 8 & 9
Globe Hoist Company 57
Goodyear Rubber Company 106

H

Harshaw Chemical Company, The 97
Hassall, John, Inc. 105
Haven Machinery & Supply Co. 100
Hough, Frank G., Co., Inc. 91

J

Johnson Gear & Mfg. Co. Ltd. 102
Johnston, A. P., Company, Inc. 118
Jones & Laughlin Steel Corp.
Stainless and Strip Division 83
Jorgensen, Earle M., Steel Co. 3

K

Kingwell Bros., Ltd. 114
Kinney Mfg. Division, The New York
Air Brake Company 14

L

Linde Company 25
Long Beach, The City of 101
Louis Allis Company, The 99
Lubriplate Division, Fiske Brothers
Refining Co. 100

M

Mathews Conveyer Co. 59
Milford Rivet & Machine Co. 78
Miller Electric Mfg. Co., Inc. 111
Milwaukee Electric Tool Corporation 18
Minnesota Mining &
Manufacturing Co. 12
Moore Dry Dock Co. 115

N

National Supply Company, The 17
New York Air Brake Company, The
Kinney Mfg. Division 14

O

Oakite Products, Inc. 105

P

Pacific Gas and Electric Company 93
Pacific Intermountain Express Co. 116
Pacific Pumping Company 103
Pacific Steel Casting Co. ..... 74 & 112
Pacific Tube Company 77
Pennzoil Company, The ..... Cover 2

R

Relton Corporation 88
Rust-Oleum Corporation 7
Ryerson, Joseph T., & Son, Inc. 26

S

Sarco Company Inc. 95
Shuford Mills, Inc. 108
Sigma Engineering Co. 112
Soule Steel Company 65
SprayKing, Inc. 80
Stackbin Corporation 96
Standard Oil Company of California 11
Surety Rubber Co., The 96

T

Ton-Tex Corporation 92
Turlock Iron & Machine Works 116

U

United States Steel Corporation
Columbia-Geneva Steel Division 89
Universal Molding Company 114

V

Viking Pump Company 108

W

Washington Iron Works 71
Windeler, George, Co., Ltd. 110

Y

Yale & Towne Mfg. Co.
Yale Materials Handling Division 63

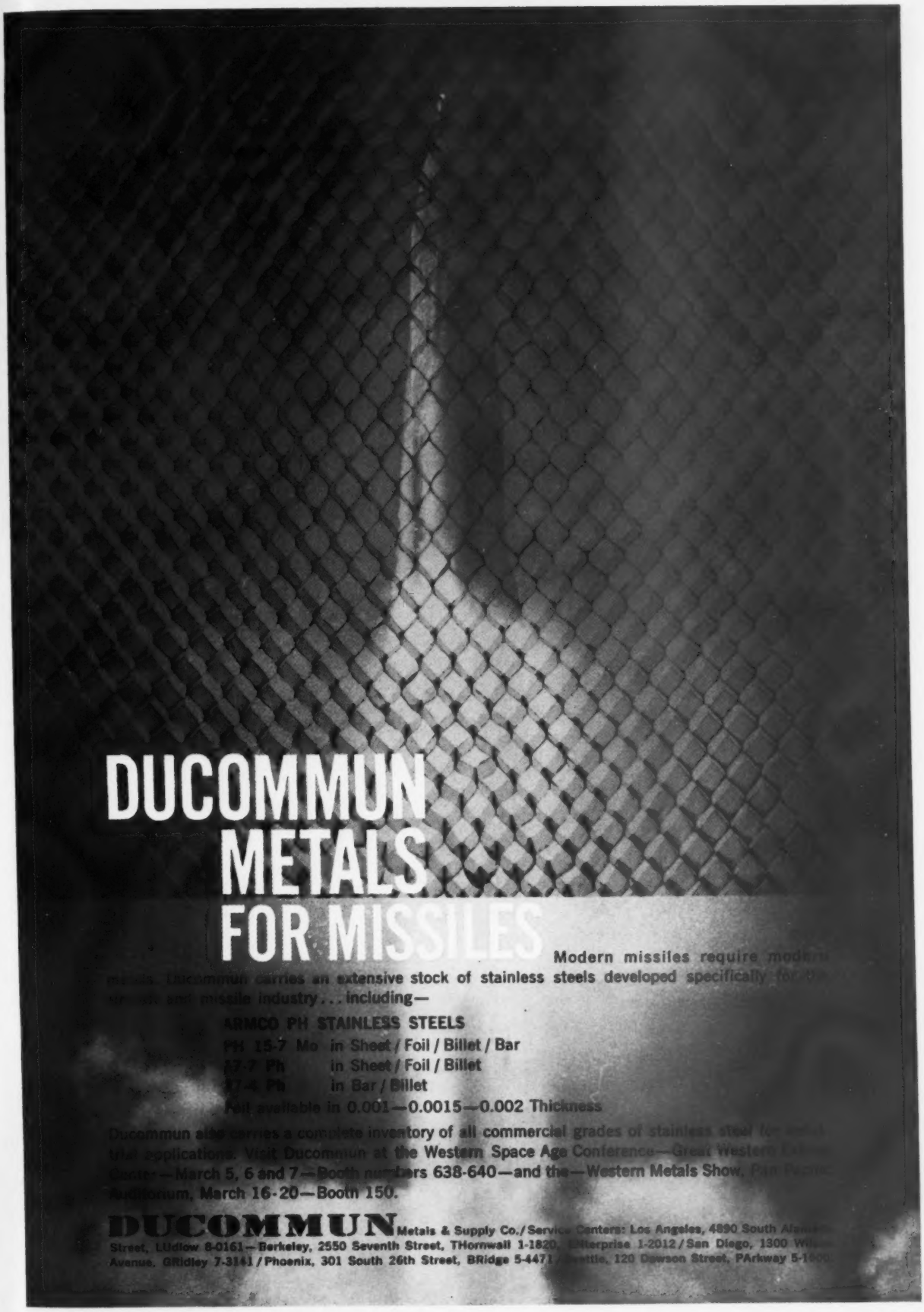
Johnston Stainless Welding Rods

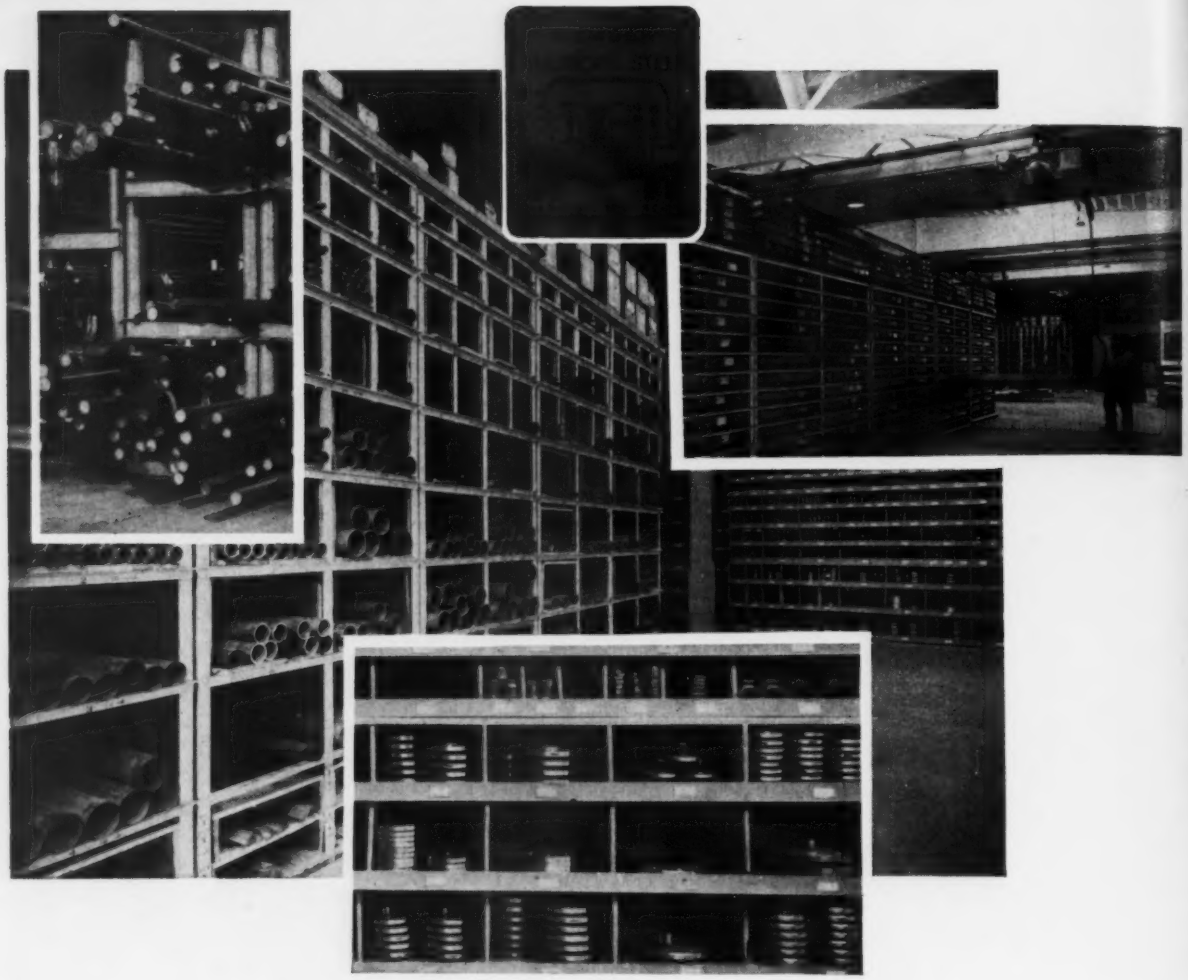
Practical, Down-to-Earth Welding Rods
Alloys as they are supposed to be

Corrosion Resistant—
Clean metal

Strong—
Low in cracking

A. P. JOHNSTON CO. INC.
1845 E. 57th St., Los Angeles 58


DUCOMMUN
METALS
FOR MISSILES
Modern missiles require
ARMCO PH STAINLESS STEELS
PH 15-7 Mo in Sheet / Foil / Billet / Bar
17-7 PH in Sheet / Foil / Billet
17-4 PH in Bar / Billet
Foil available in 0.001—0.0015—0.002 Thickness
Western Space Age Conference
Western Metals Show,
DUCOMMUN Metals & Supply Co. / Service Centers: Los Angeles, 4890 South
Street, LUdlow 8-0161 — Berkeley, 2550 Seventh Street, THornwall 1-1820,
Avenue, GRidley 7-3141 / Phoenix, 301 South 26th Street, BRidge 5-4471,



STAINLESS A-2-Z

EVERYTHING IN STAINLESS

SHEET • PLATE • BAR • WIRE
PIPE • TUBING • FITTINGS
FASTENINGS • VALVES • PLASTICS

A new alloy? No . . . just a quick way of saying, "For everything—EVERYTHING—in stainless steel, call *ESCO!*" There's a completely stocked *ESCO* warehouse near you.

You save money, effort and floor space by relying on *ESCO* to stock your Stainless Steel Requirements. And you're always assured of a constant supply of widely diversified products when you need it.

Check the list at the left for your stainless steel needs in 300 and 400 series, Hastelloys*, Carpenter 20, precipitation hardening grades and polyvinyl chloride (PVC) plastics, too. You'll find that for everything—EVERYTHING—in stainless steel, it's best to call *ESCO*.

*Trademark Union Carbide Corporation

ESCO®

ELECTRIC STEEL FOUNDRY COMPANY

2141 N.W. 25TH AVENUE
PORTLAND 10, OREGON

Call your nearest ESCO Warehouse

PORTLAND, OREGON	2141 N. W. 25th Avenue, CApitol 8-2141
SEATTLE, WASHINGTON	1131 W. Hanford Street, ELliott 4160
SAN FRANCISCO BAY AREA	Emeryville, Calif., 1280 65th Street, OLympic 4-2732
LOS ANGELES, CALIFORNIA	6415 E. Corvette Street, RAymond 3-8601
SPOKANE, WASHINGTON	N. 1327 Washington Street, FAirfax 5-4507
EUGENE, OREGON	1464 W. 6th Street, Diamond 3-2585
DENVER, COLORADO	3940 Grape Street, FLorida 5-2349
HONOLULU, T. H.	630 South Queen Street, 6-6186

. . . for more details, circle No. 87 on Reader Service Postcard